Public Health Is Purchasable. Within Natural Limitations Any Community Can Determine Its Own Death Rate

MANUAL FOR PUBLIC HEALTH NURSES

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INTRODUCTION

With the large increase in the number of public health nurses employed in New York State, there has developed a distinct need for a compilation of information regarding the work of the public health nurse in all its various phases to which the nurse can refer when any question arises as to the scope of her work, and her legal limitations. At the risk of being too voluminous it has been broadened to include various information, which, while perhaps outside the actual field of her activities, is nevertheless closely related to certain branches of her work and about which she should be well informed.

In a field which is developing so rapidly, it is inevitable that some important features may have been overlooked or insufficietly discussed. Certain aspects already well covered in available printed from have been omitted. It is therefore earnestly hoped that those who use this book will feel free to indicate to this Department wherein it may fail in any way to meet their needs.

Securing a Nurse

One of two reasons usually influences a community to employ a public health nurse; first, the knowledge of the existence of a considerable amount of sickness and physical disability in the municipality for which no adequate remedial care is provided; or second, the belief that such a condition may exist of which the actual extent is unknown, with the conviction that if existing the situation should be corrected. A nurse is thus often employed to make a survey of health and sanitary conditions and report thereon to the agency employing her. As a result of such report a campaign may be organized to provide the machinery for the correction of the conditions. This may call for a consolidated health district, a hospital or free clinic of some sort, or for the permanent employment of a public health nurse.

To secure the funds necessary for these health activities, some sort of a publicity campaign is usually essential. It matters little whether the group to be convinced be a legislative committee, a county board of supervisors or the individual voters, as in a referendum; the method utilized is that of a powerful, convincing appeal with provision for immediate enthusiastic action. In health conservation propaganda one must not forget that the public will demand and usually get what it really wants. The problem becomes, then, to make the public desire this additional health conservation machinery. The recent world war demonstrated that even enemies are glad to work together for a common cause. With a convincing publicity campaign, the aim was to "go over the top" in contributions. To secure this form of publicity and this reaction requires hard work by someone, and the particular sort of ability which makes certain that channels for action are at hand when emotion is at its height. Every community has had practice in this work during the war and knows how these matters are handled. The method for securing financial support for a nurse is not greatly different from that employed in securing contributions for starving war orphans or Liberty Loans. Provision must be made so that the supporters of the work shall individually continue to receive some personal satisfaction from their efforts, otherwise their interest and continued support can not be looked for.

Local chapters of the American Red Cross are authorized through the Chapter Committee on Nursing Activities to develop, or aid in developing within their districts, such public health nursing service as is desirable and meets the approval of the Chapter Executive Committee. Such public health nursing service is not initiated or supported by the Red Cross except to cooperate with or aid other established agencies.

Reports and Records

Mr. Harrington Emerson has defined a record as a "statement of fact," and a report as "an expression of opinion." Among the necessary qualities of a good report according to this author are several which a public health nurse will find especially applicable.

"The qualities of a good record.— it should be necessary, it should be authorized, it should be reliable and sufficiently accurate, it should be available, it should be adequate giving essentials, it should be simple, very clear and easy to understand, it should be initiated at the moment the event is occurring, it should be easy to make, and it should be signed or certified by the maker."

Very few ready made record cards altogether fit requirements in rural and other small communities. Many nurses will prefer to use blank cards, developing their own system of records in accordance with the needs of their particular service. When this is undesirable certain standardized cards are available. Probably the best system of cards procurable for general nursing work is that which has been prepared by the National Organization for Public Health Nursing.

To be of value reports should show the nature, scope and human side of the work. They should aim to show what progress has been made and foreshadow changes about to be necessitated because of growth of the work. A daily record of work done including time and expenses, should be kept. Reports should be made regularly to the health officer or proper authority, and as regularly published, generally, in local newspapers. This is essential for securing continued interest and cooperation from the public, without whose support no nurse's work can be of value.

CHAPTER I

Public Health Nursing in New York State

Public health nursing is a comparatively new institution. Progressive sanitary authorities now admit that the enforcement of sanitary laws for the prevention of disease has its distinct limitations, and that something more is needed for the protection of the public. Ignorance in the home still exists even with the best possible sanitary surroundings obtainable by police power, and the conditions springing from such ignorance remain a constant menace to the public health. This fact was first recognized in the tuberculosis campaign, and later, in the campaign against infant mortality, was fully realized. It was found that instruction in personal hygiene in the home is urgently needed both by the tuberculous patient in the one case and by the mother in the other,— by the patient in learning how to avoid the spread of infection, and by the mother in learning how to care for her child. Such instruction was seen to be the most powerful single measure that boards of health could utilize. Hence the institution of the public health nurse with her various powers, duties and activities.

Powers

Source of power. The employment of nurses in the promotion of public health is authorized in New York State by (1) the public health law; (2) the education law; and (3) the county law, as follows:

Section 4-a (12) *public health law:* "The commissioner of health, whenever he may deem it expedient so to do, may employ such number of public health nurses as he may deem wise within the limits of his appropriation and may assign them from time to time to such sanitary districts and in such manner as in his judgment will best aid in the control of contagious and infectious disease and in the promotion of public health."

Section 21-*c public health law:* "Each health officer or other official exercising similar duties, by whatsoever official designation he may be known, shall have power to employ such number

of public health nurses as in his judgment may be necessary within the limits of the appropriation made therefor by the city, town, or village. They shall work under the direction of the health officer and they may be assigned by him to the reduction of infant mortality, the examination or visitation of school children or children excluded from school, the discovery or visitation of cases of tuberculosis, the visitation of the sick who may be unable otherwise to secure adequate care, the instruction of members of households in which there is a sick person, or to such other duties as may seem to him appropriate."

Section 570 *education law:* "Medical inspection shall include the service of a trained, registered nurse, if one is employed."

Section 571 *education law:* "Any such board of trustees may employ one or more school nurses, who shall be registered trained nurses and authorized to practice as such. Such nurses being so employed shall aid the medical inspector of the district and shall perform such duties for the benefit of the public schools as may be prescribed by such inspector. A medical inspector or school nurse may be employed by the trustees or boards of education of two or more school districts." . . .

Section 47 (9) *county law* (*Am'd in* 1918): "The board of managers (of a county tuberculosis hospital) . . . shall employ a county nurse or an additional nurse or nurses, if it deems necessary, for the discovery of tuberculosis cases and for the visitation of such cases and of patients discharged from the hospital, and for such other duties as may seem appropriate; and may cause to be examined by the superintendent or one of his staff suspected cases of tuberculosis reported to it by the county nurse or nurses or by physicians, teachers, employers, heads of families or others and it may take such other steps for the care, treatment and prevention of tuberculosis as it may from time to time deem wise. In cases, however, where it is not mandatory to establish a county tuberculosis hospital and no board of managers has been provided, the board of supervisors shall have the power to appoint and employ such nurse or additional nurse or nurses, and appointments heretofore made by boards of supervisors in such cases are hereby ratified, confirmed and legalized."

Qualifications

In accordance with section 2-c of the public health law, the Public Health Council has prescribed the following qualifications for supervisory public health nurses:

"Supervising public health nurses employed by the state department of health shall possess the following qualifications:

(1) They shall be registered nurses;

(2) They shall submit evidence satisfactory to the public health council of training and experience of not less than two years after graduation, in one or more of the following lines of work:

(a) Maternity work;
(b) Infant welfare work;
(c) Social service;
(d) Tuberculosis work;
(e) Care of communicable disease; and
(f) School nursing.

(3) They shall be, when appointed, not less than twenty-five years of age."

To practice as a registered nurse (R. N.) in the State of New York it is necessary to comply with the requirements of sections 250 to 253, inclusive, of the public health law. Certificates are issued by the regents of the state of New York to the nurse who successfully meets the conditions imposed. A civil service examination is required for the permanent appointment of a nurse by state or city departments of health, or by a district whose officers are classified by the State Civil Service Commission.

A public health nurse must possess not only nursing but social and administrative qualifications. In addition to training in the care of the sick she must have experience in the recognition and care of various diseases, especially communicable diseases. She must be practical, and her instructions should be combined with tact, encouragement and assistance. The latter may come first in placing the patient in touch with a tuberculosis clinic or charitable organization, making arrangements for admission to a hospital or a sanatorium, and the like. She must be able to distinguish between what is essential and

what is not, for many mothers and families whom she will instruct will probably be poor, ignorant and busy, with neither time nor inclination to do more than what is absolutely necessary. A public health nurse must have not only technical training in nursing the sick — for though she may perform but a limited amount of bedside nursing work, she must be able to instruct others — but she must also have social qualifications. Her work is often with well people,— parents, teachers, superintendents of institutions, and others who are responsible for dependents under them, and with members of societies and officials upon whom rests the responsibility for making new sanitary regulations and for improving health conditions. She must be able to impress these people with the value of her work, and the desirability of her ideals by the force of her personality. She must be self-reliant and businesslike in her methods, able to cope with the various health problems which she meets in the home, in the office, and in the social community. She must have the gift of making friends, of getting others to work willingly and cheerfully in cooperation with her, of inducing parents to follow her directions, and members of philanthropic societies and health and welfare associations to give her active support. She must keep full and accurate records of her work and should be able to interpret them in an interesting and convincing manner. Finally, she must have good health herself and a strong physique to enable her to endure the strain of constant house to house visitation and frequent traveling from place to place.

DUTIES

The primary duties of the public health nurse are to advise and instruct — to advise and show others how to care for the sick, to secure for them adequate care, and to instruct people how to avoid sickness by attention to personal hygiene. Bedside nursing of the sick poor is not one of the primary functions of the public health nurse, such work being usually performed by the "visiting" nurse; but the public health nurse should maintain constant cooperation with such nurses and refer to them any cases which need special nursing attention.

Among the important duties which are performed by the State Department of Health nurses are the following:

(1) Discovery and investigation of cases of communicable disease;

(2) Sanitary surveys and the collection of information for specific objects, such as the discovery of tuberculosis cases, the prevalence of venereal disease, and the investigation of home conditions affecting infant mortality;

(3) The after-care of cases of poliomyelitis;

(4) Urging the employment of nurses in industrial establishments and cooperation in the work of industrial nurses;

(5) The inspection and supervision of midwives;

(6) Instruction in conduct of infant welfare stations and tuberculosis dispensaries;

(7) The registration of unreported births;

(8) School inspection; in cooperation with the school medical inspector;

(9) Conducting exhibits;

(10) Educational work, lectures, demonstrations, etc;

(11) Supervising and instructing local public health nurses.

The duties which are usually performed by public health nurses employed by the boards of health of local municipalities are:

(1) The discovery of mild or unrecovered and unreported cases of communicable disease;

(2) The investigation and improvement of home conditions which affect infant mortality;

(3) The conducting of infant welfare stations;

(4) The securing of medical or hospital care for the sick;

(5) Cooperating with social agencies in promoting public health work, including the control of venereal disease.

(6) Cooperating with overseers of the poor in improving health conditions among the dependent poor;

(7) Preventive and after-care work in poliomyelitis, cases of mental defect, insanity and blindness;

(8) Antituberculosis work;

(9) Educational work, such as instruction of Red Cross classes and Little Mothers' Leagues;

(10) Investigations of food stores, dairies, playgrounds, public toilets, etc.;

(11) Assiting the health officer in securing laboratory specimens for diagnostic purposes.

(NOTE: In working for local boards of health, the public health nurse is under the direction of the local health officer. When representing the health officer she acts as his deputy, and nurses employed by private organizations should be so deputized by local boards of health.)

The following duties are usually performed by county tuberculosis nurses:

(1) The discovery of unreported cases of tuberculosis;

(2) Enlisting the interest of physicians in the examination and treatment of tuberculous patients;

(3) Studying the morbidity and mortality statistics of the various municipalities with special reference to tuberculosis;

(4) Arranging for the admission of tuberculous patients to hospitals and securing the attendance of known cases and contacts at clinics;

(5) Attending tuberculosis clinics;

(6) Home visitation and instruction of tuberculous patients;

(7) Giving lectures and demonstrations on antituberculosis work.

(NOTE: The director of the county nurses is the superintendent of the county tuberculosis hospital, but she will also be under the direction of the local health officer in her field work.)

The principal functions of the school nurse are as follows:

(1) The discovery and prevention of communicable diseases among school children;

(2) The discovery and correction of physical defects;

(3) The visitation and instruction of parents of school children who have physical defects;

(4) Giving simple routine treatments prescribed by the medical inspector and the family physician;

(5) Attending school clinics;

(6) Assisting the medical examiner of the school;

(7) Instructing special groups of children in practical hygiene.

(NOTE: The school nurse works under the immediate direction of the medical inspector of schools, but she should also cooperate with the health officer and other public health workers.)

LEGAL STATUS AND AUTHORITY

The public health nurse should be familiar with the sources from which she derives her legal status and authority, and by

virtue of which the various activities of departments of health are conducted. She should know them not only for her own protection but in order that she may direct inquirers to the proper sources of authority and information. The work of a public health nurse consists largely in collecting and giving information, and she must be able to point to a specific law, regulation or order under the authority of which her acts are legalized; in other words, she must know exactly what can be done legally and what can not.

The legal authority for most acts of a nurse employed or directed by the State Department of Health is derived from section 4 of the public health law as follows: "The commissioner of health or any person authorized by him to do so, may, without fee or hindrance, enter, examine and survey all grounds, erections, vehicles, structures, apartments, buildings and places." And again: "He (the commissioner of health) shall make inquiries in respect to the causes of disease, especially epidemics, and investigate the sources of mortality, and the effects of localities, employments, and other conditions upon health. He shall obtain, collect and preserve such information relating to mortality, disease and health as he may deem useful in the discharge of his duty or may contribute to the promotion of health or the security of life in the state."

A supervising nurse employed by the State Department of Health is assigned to a particular duty and her powers and responsibilities are limited to the discharge of that duty. If she meets with opposition which she can not overcome, she is expected to communicate with the State Department of Health at once and be governed by the instructions given her.

A nurse employed by a local board of health or acting under its jurisdiction is the representative of the health officer. According to section 26 of the public health law, "Every such board shall receive and examine into all complaints made by any inhabitants concerning nuisances, or causes of danger or injury to life and health within the municipality, and may enter upon or within any place or premises where nuisances or conditions dangerous to life and health or which are the cause of nuisance existing elsewhere, are known or believed to exist, and by its members or other persons designated for that purpose, inspect and examine the same.

The owners, agents and occupants of any such premises shall permit such sanitary examinations to be made."

If the nurse is denied entrance to any premises, or if she is refused any information requested, the facts must be reported to the health officer who then takes charge of the matter.

A nurse is protected against acts done in the performance of her duty by section 21-b of the public health law: "No health officer, inspector, public health nurse, or other representative of a public health officer, and no person or persons other than the city, village or town by which such health officer or representative thereof is employed, shall be sued or held to liability for any act done or omitted by any such health officer or representative of a health officer in good faith and with ordinary discretion or under the direction of any such city, village or town, or pursuant to its regulations or ordinances of the sanitary code or the public health laws."

A public health nurse employed by a society has official standing when the board of health appoints her as the agent of the health officer and enters the appointment in the minutes of a regular meeting.

A public health nurse employed by the board of managers of a county tuberculosis hospital deals primarily with tuberculosis cases, and if opposed in an investigation, she must report the facts to the superintendent of the hospital or to the proper health officer.

A nurse employed by the school authorities of a district derives her powers from the department of education, but she is expected to cooperate with the board of health in matters in which the jurisdiction of the two departments overlap.

LAWS, REGULATIONS AND ORDERS

Public health nurses and all other officials under the jurisdiction of the State Department of Health or a local board of health, derive their authority from the following sources:

(1) Statutory and common laws; (2) the state sanitary code; (3) orders and instructions of the state department of health; (4) a local sanitary code; and (5) special orders of a local board of health.

Statutory laws are acts passed by the Legislature, called statutes. Examples of such laws are the public health laws, the village laws, the penal code, etc. These laws are grouped together under special titles and numbered by articles and sections in order to identify them; as, for example, section 21-c of the public health law, giving authority for the employment of public health nurses.

Common laws consist mostly of interpretations by the courts, especially decisions of the Court of Appeals, which decisions have practically the force of statute law throughout the State. They are issued in volumes, and reference to a decision of the court is made by giving the number of the volume, abbreviated name of the State, and the page; as, 135 N. Y. 390 (Vol. 135 of the New York Reports of the Court of Appeals, page 390).

The sanitary code is enacted by the Public Health Council of the State Department of Health, by authority of the legislature giving it the power to make regulations governing all matters which affect life and health. The sanitary code is the health officer's guide, and must often be consulted by the public health nurse. The sanitary code and public health laws, together with special regulations issued by the State Commissioner of Health, are published by the State Department of Health in a book entitled "The Public Health Manual," a copy of which is a necessary part of the equipment of every public health official and may be obtained free upon request. A nurse, when given an assignment, is expected to familiarize herself with the laws of the State and the regulations of the sanitary code bearing upon her work.

Special orders, instructions and regulations are frequently issued by the State Commissioner of Health under the authority conferred by the public health law and the sanitary code, and they are authoritative.

Each local board of health may enact regulations upon matters relating to public health in the municipality, provided that the regulations do not conflict with statute laws or regulations of the state sanitary code. These regulations constitute the local sanitary code. Each community is granted a broad measure of home rule in all matters pertaining to health and sanitation. It may increase the stringency of a regulation of the state sanitary code, and may enact regulations on matters not mentioned in the

state code. A local board of health may also issue a special order to an offender or may abate an insanitary condition which is not covered by the sanitary code of the State or of the municipality. This gives the local board of health the power to deal with cases in an emergency or with new problems. A nurse who works within the jurisdiction of a local board of health is therefore expected to secure copies of the local ordinances and special orders.

RELATIONS

Relation to health officers. Sections 4 and 21-b of the public health law use almost identical language in placing the responsibility for enforcing the public health law and the sanitary code upon the Commissioner of Health and also upon the health officers. The State Department of Health has assumed the principal part of the work in some activities, such as the supervision of midwives, the registration of births, deaths and marriages, and the conducting of public health campaigns. It is the duty of the health officer to supply a public health nurse engaged in these activities with information, and to assist her in reaching its sources.

Other activities, such as the suppression of epidemics and the abatement of nuisances, belong primarily to the health officers. In these lines of work a public health nurse acts under the direction of the local health officer.

A public health nurse employed by a board of health is subject to the direction of the health officer. If she is dissatisfied, her appeal is first to the health officer and then to the board of health.

While a county tuberculosis nurse is not under the authority of any health officer, yet it is expected that she will work in cooperation with the local health officer in each municipality and any question in dispute should be settled by the superintendent or the board of managers of the tuberculosis hospital. (See also Regulations, Laws and Agencies relating to Tuberculosis published by State Department of Health.)

Relation to physicians. A public health nurse can be of great assistance to physicians, especially in connection with patients who are too poor to pay or are too ignorant to follow directions. She can not only relieve the physicians of the burden of explaining the

nature of disease and the methods of treatment to the ignorant, but she can persuade the careless and indifferent to persevere in scientific methods of treatment. It is not her place to make distinctions between physicians but extend to all equal courtesy and respect. If a person has a preference for any particular physician, it is the duty of the nurse to regard that preference. If she is loyal and helpful to all physicians alike she has a right to take an indigent patient in need of medical assistance to the physician whom the patient prefers and to receive free advice as to the condition and treatment of the case.

Relation to relief organizations. A public health nurse should cooperate with relief officers and organizations, such as overseers and superintendents of the poor, societies for the prevention of cruelty to children, and for the prevention of blindness, Red Cross societies, charitable organizations, and churches. She works with all these agencies, and is one of their principal representatives in lines of work affecting the health of persons who are unable to care for themselves. She refers cases to them, and secures their assistance in her own health work.

Relation to the public. The relation of a public health nurse to the public is principally that of an investigator, adviser and teacher. Her methods are those of persuasion and instruction rather than force. It is not within the scope of her work to issue orders or to make threats against offenders. If legal action or force is necessary, it must be applied by the health officer, or by the State Commissioner of Health.

Work and Activities

Assignments. A public health nurse employed by the department of health of the state or of a city receives from time to time, usually in writing, special orders or assignments. If employed by a local health board the nurse may do any branch of public health work that occasion requires; but every such nurse is responsible to the local health officer from whom she receives her assignments and to whom she is expected to report the results of her work. The work of a public health nurse may be classified as field and office work.

Field work. Field notes, taken on the spot, are an indispen-

sable part of all field work. Every nurse should carry a notebook in which she can make records while doing her work. In investigating an outbreak of an epidemic of measles, scarlet fever or typhoid fever, for example, she should make her records at each house or place that she visits as she obtains her information, writing down the names and addresses of the cases and contacts, the dates of onset of illness, and all other facts or conditions which relate to the epidemic. This is absolutely necessary, not only because she can not trust to memory for such details, but because the notebook is positive evidence of what she discovered by her investigation and will be accepted as such in law should the case come before the courts. Minor items which would ordinarily be forgotten if not recorded, may also form clues which may lead to further important information or serve to confirm other facts, and if these are set down in writing they may be studied at leisure.

Office work. The routine office work of a public health nurse will usually be done along the following lines:

(1) Reviewing, analyzing, arranging and tabulating her field notes;

(2) Formal reports;

(3) Research work in the office files and library;

(4) Correspondence;

(5) Reading and study.

A field notebook is a collection of items recorded in the order in which the information was obtained, without regard to arrangement. The notebook is intended for the use of the nurse only, and it should be preserved in its original form as confirmative evidence of the facts, should they be disputed; but the items require to be classified and arranged in such manner that the facts which they record are readily available to others. To do this will take time which can not be spared in the field, where much of the work will be done. Hence it has to be completed in the office.

The State Department of Health requires formal reports of all work done by nurses in its employ. Similar reports should be required of nurses employed by local boards of health or by private agencies. Such report should be transmitted through the local officer of the board of health. The preparation may require

more time than the field work which it represents. The report should be descriptive and statistical, giving a summary of the work done with its various items. It should give a clear, complete and concise review of the situation. It may begin with a short description of the work and end with a statistical summary. The report must mention the assignment for doing the work and from whom it was received, and it must contain sufficient data to enable the reader to understand why, when, where and how the work was done and the reasons for doing it. If previous reports of the same conditions have been made they should be referred to in such a way that they may be easily identified. If an assignment of work requires several days to complete, a report of the progress of the work must be made daily. These daily reports may be so made that collectively they form the complete report. A nurse's work is constructive, not destructive; its object is not to criticize past mistakes but to improve future health conditions. If she finds, therefore, that work previously done by another is faulty, due to ignorance or incompetence, she may report this to the State Department of Health, but she should avoid all local fault-finding and offer advice and assistance only to improve the conditions, without personal comment of any kind.

A nurse is often required to do research work in looking up reports of work similar to hers and in reading articles on the subject in books and periodicals in order that she may coordinate her report with that of other workers in the same field. Moreover, she should become familiar with what others are doing in her line of work so that, when written, her report will be a contribution to existing sanitary information.

A public health nurse is expected to devote some time to reading and study on all subjects relating to public health, on general subjects of information so that she may be prepared for any assignment, even though it be outside of her particular line of work. Opportunity should be given to attend conferences as provided for by law and special schools or courses of instruction, possibly at the expense of the municipality, private organization or industry by which she is employed if the benefits derived are likely to be commensurate with the expense involved.

A State Department of Health nurse who is sent to a city or village should communicate first of all with the sanitary supervisor of the district, and with the local health officer. She should always do this even when assistance is not required. The sanitary supervisor and local health officer are entitled to be informed concerning every health activity in their district. The nurse and the local officials can always be of mutual assistance to each other and recognition of this fact will promote good will and cooperation.

A public health nurse is expected to be able to conduct her own investigations independent of direct assistance; she is not supposed to be dependent upon any local official for material assistance, transportation, or other personal help. If it is necessary to give a nurse assistance the assigning officer will arrange for the specific assistance to be given. At the same time it is the duty of every local health officer or registrar to allow the nurse access to his official records and to give her any official information that she may require.

Expenses. A public health nurse should be allowed necessary traveling and hotel expenses while doing field work. She should be expected to use the ordinary public conveyances such as railroads, trolleys, bus lines and steamboats whenever possible and not to hire special conveyances unless no public conveyance is available. When unusual expense is incurred, she should obtain a receipt for it.

Hours of duty. A public health nurse should be on duty from 9 o'clock A. M. to 5 P. M., with an hour for lunch. If she is doing field work her hours will be irregular according to the character of her work. She may have to work all day and in the evening, as in securing cultures and specimens. She should devote sufficient time to the work in hand to accomplish it efficiently and promptly. A public health nurse should not be expected to work on Sunday although in an emergency she may be required to do so.

Lines of work. The three great divisions of work in which public health nurses and all public health officials are engaged are:

(1) Sanitation;

(2) Control of communicable diseases; and

(3) General measures for the improvement of health and the prevention of disease.

Sanitation. Sanitation is concerned with the environment of man and deals with the physical conditions outside of the body affecting the public health, rather than with the individual himself, which constitutes personal hygiene. Sanitation is the peculiar field of work of the sanitary engineer or inspector, and not of the health physician or nurse; but when no sanitary inspector is available, the public health nurse may be called upon to assist a health officer in making the annual sanitary survey of a district, as required by section 21-b of the public health law, or she may be assigned to make a formal sanitary inspection.

This survey or inspection should take cognizance of and include a report on the sanitary conditions of all buildings and premises, public or private, where a menace to health may exist; and supervision must be maintained to prevent the recurrence of insanitary conditions.

The following conditions are to be specially investigated:

(1) Food sanitation, including the milk supply and food supplies other than milk, to insure pure food supplies and the prevention of insanitary methods of handling;

(2) Water supplies, to insure pure supplies of water and the prevention of careless disposal of human excrement;

(3) Sewage and waste disposal; and

(4) Breeding places for flies, mosquitoes and other insects and vermin.

Control of communicable diseases. The control of communicable diseases is related to man himself, and the disease germs which grow within the human body far more than with man's environment.

For supervision in the control of communicable diseases the public health nurse may be assigned to any or all of the following lines of work:

(1) Investigation of the modes and channels of infection;

(2) Discovery of unrecognized or unreported cases;

(3) Instruction of the public in measures to prevent further spread of infection;

(4) Securing laboratory specimens for diagnostic purposes;
(5) Supervision of quarantine;
(6) Cooperation of school and health authorities in the control of communicable diseases;
(7) Cooperation with various charitable organizations for adequate hospital care of the sick and
(8) Cooperation with other philanthropic agencies for prevention of needless distress in families under quarantine or otherwise disabled (as in tuberculosis) by the presence of disease.

In making investigations for the discovery of unreported cases the nurse may be required to prepare maps and charts to illustrate the facts in graphic form. She may also be requested to furnish material for the press in order to arouse public sentiment and thus assist in controlling the situation.

General measures. Every constructive program for the improvement of health and the prevention of disease should be preceded by a preliminary study of the conditions present in a community which are inimical to health. For example, it would be obviously unnecessary to do extensive educational work for the reduction of infant mortality in a community which has a low infant death rate, or to devote much time and labor to propaganda for the prevention of tuberculosis in a district where comparatively few cases of this disease occur. Local conditions studied in advance must determine what work is needed. One may often learn from reports of other communities how certain results have been accomplished. Communities, however, have their individualities just as persons have, and it is not always practicable to employ in one community the methods which have proved successful in another. Each community must be studied by itself.

General measures for the improvement of health and the prevention of disease will include the following lines of work:

(1) Public health education;
(2) The study of vital statistics records;
(3) Infant welfare activities;
(4) Supervision of midwives;

(5) Control of communicable disease, including tuberculosis and venereal disease;

(6) Health supervision of the school child;

(7) Hygiene of home and workshop; and

(8) Mental hygiene — prevention of insanity and mental defects.

CHAPTER II

Sanitary Inspection

The public health nurse, in making a sanitary survey of a district, should carefully observe the surroundings of every locality which she visits, whether it be for the control of communicable disease, for the promotion of child welfare, or for some other purpose. She may also be assigned to the work of making a formal sanitary inspection.

Dryness, sunlight and cleanliness are the keynotes of sanitation in the modern acceptation of the term. We now know that most disease germs do not grow and multiply in such environment. Not all conditions which appear dirty or unsightly are necessarily dangerous to health, but on the other hand, apparently clean and sightly surroundings may not be sanitary. Almost all of the communicable diseases are contracted through close personal contact with human beings, the greatest enemy to mankind being man himself.

The chief importance of insanitary conditions due to the lower animals, to decaying vegetables and to dirt from inanimate sources, is that they may permit the breeding of flies, and other insects and vermin which may be the means of transmitting disease germs of human origin and so indirectly cause the spread of infection. Most of the diseases of man, especially those which occur in epidemic form, are peculiar to human beings. Some of these infections may be communicated to the lower animals under experimental conditions, but they do not occur in them as a rule under natural conditions. Formerly sanitarians regarded the environment as the main source of infection; but it has been found by experience that though this may be the medium of conveyance of disease it is not the source of infection. When a nurse makes a sanitary inspection, therefore, she must look especially for conditions which are of human origin.

The danger to health from human excretions arises from the

fact that disease germs may be present in them. All human beings do not give off infectious organisms but only sick people or disease carriers; the latter are persons who harbor germs of a certain disease without showing symptoms of it. Those who discharge disease germs constitute but a small proportion of the population. Many persons excrete these germs without knowing it and take no care of their excretions. For this reason it is extremely difficult to control disease carriers. Any collection of human excretions may contain disease germs from an unsuspected sourse and therefore should be considered as suspicious or dangerous however small the amount. Millions of disease germs may be present in an infinitesimal quantity of excretion deposited on soiled hands. Even a single typhoid bacillus in milk may cause an epidemic, while a drop of intestinal excretion from a typhoid carrier may infect a household water supply.

Insanitary conditions which produce disease may be few in a given community, but efforts should be made to abate all such conditions. One of the chief factors in increasing the danger from insanitary conditions is congestion of population. A single family living in the country, separated widely from other people and seldom receiving visitors, runs little chance of disease infection, but if there are a hundred or more families in a group, or if a large number of persons are crowded upon a small area and the families live in cramped dwelling quarters, congestion favors the transmission of disease, especially if it is associated with poverty, ignorance, uncleanliness and low standards of living. Insanitary conditions, therefore, which may be comparatively harmless at an isolated farmhouse, become an actual menace to health in a village or city. As population increases the importance of sanitation grows at a relatively much more rapid rate. Urban or concentrated populations present far greater sanitary problems than rural scattered populations.

Insanitary surroundings affect health in direct proportion to the opportunity for contaminated substances to enter the body. The principal agents for the transmission of contaminated substances are: (1) persons, by coming in contact with such substances; (2) food; (3) flies; (4) drinking water.

Persons may transmit contamination from their hands, clothing and from various articles to other persons by personal contact. Food and water even slightly contaminated are likely to produce disease because they are taken into the body in considerable quantity where the conditions are favorable for the growth and multiplication of the disease germs. House flies breed in horse manure and human excrement and in fermented and putrefying vegetable matter, and they may contaminate food supplies by acting as mechanical carriers of infection. Decaying and putrefying vegetable matter, though offensive to the senses, is not necessarily dangerous unless it contains disease germs deposited in it from human sources. Decaying substances do not in themselves cause disease, although indirectly they may affect health by forming breeding places for flies.

If a nurse is asked to make a sanitary inspection of occupied houses and premises she should begin by asking the owner, agent or occupant of the premises to accompany her or to give her permission to make the inspection. Although a health department nurse has a legal right to inspect insanitary premises she should use diplomacy and tact rather than legal authority to achieve her object. If she is refused admission the fact should be reported immediately to her superior officer, but as a rule the nurse will be well received. She should confine her inspection strictly to the work in hand, the sanitary conditions which caused her inspection of private property, and make no comments about other matters.

Conditions which a nurse is ordinarily requested to observe are: (1) general topography; (2) housing; (3) cleanliness; (4) household drainage; (5) disposal of human excrement; (6) garbage disposal; (7) barnyard conditions; (8) breeding places of flies, mosquitoes, etc.; (9) water supply; (10) milk supply; and (11) food handling. These are the most important conditions directly affecting health, though there are many others having little or no effect upon health which may be classed as nuisances and which are under the control of the department of health and also within the scope of inquiry by the sanitary inspector or nurse.

General topography. This includes relation and reference to wells, bodies of water, woods, houses and other features of the

locality. The most important thing for the public health nurse to note is the soil in relation to household drainage; the slope of the ground surface in order to determine the direction of the flow; the nature of the soil, whether rocky, clayey or sandy, in order to observe its capacity to absorb and conduct the drainage; and the character of the subsoil from which the private water supply is drawn.

Housing. The next point to observe is the house in relation to the size of its living quarters and the number of persons occupying a room, in order to determine whether it is overcrowded or inadequately ventilated. In connection with housing are to be considered such conditions as darkness, dampness, cold and uncleanliness. Darkness is usually associated with dirt and dampness. A lack of sufficient windows will affect health. A house that is out of repair is often an indication of a low standard of living. The sensation of warmth or coldness will be a rough guide as to the temperature of a room, and the odor of the indoor air as to ventilation. Ventilation and heating are important factors in housing; and will be discussed later.

Cleanliness. Cleanliness is the corner stone of sanitation. Cleanliness of rooms, furnishings and persons are most important points to observe in making a sanitary inspection. The sanitarian's conception of cleanliness of surroundings has greatly changed with the advance of knowledge as to the kinds of dirt, the degrees of dirtiness and the nature of these in relation to health. The modern standard of cleanliness is not physical or esthetic, but biological. The infection on household utensils or in water, milk, food or on other objects can not be seen, although the danger of such invisible dirt is known. It requires a bacteriologist to tell the difference between clean dirt and insanitary dirt. We must therefore insist upon scrupulous cleanliness and educate people to understand the biological meaning of this term. Experience has taught that cleanliness is the most efficient single means that we possess for protection against disease; that clean surroundings are apt to be free of infection; that clean food is apt to be safe food. This practically means that only dirt which is contaminated with disease germs is dangerous to health. House dirt may contain disease organisms, especially that which has been

recently contaminated with human discharges. Drying usually kills most disease germs within a few hours, but the germs may be alive for some time in dust containing freshly dried excretions. Few bacteria will survive vigorous washing and cleansing such as a cleanly and careful housewife gives to her rooms and furniture. The public health nurse should therefor carry on a campaign for sanitary cleanliness just as the surgeon does for surgical cleanliness.

Household drainage. The drainage from a household is an important item in every sanitary inspection. If the waste water is conducted into a sewer the nurse should observe only the cleanliness of the plumbing, and take note of any suspicious leakage. If the house has plumbing which is connected with a cesspool she should inspect the latter to see whether it is properly covered and not overflowing. If the house has no plumbing she should observe whether or not the waste water from the kitchen and laundry is allowed to accumulate in pools near the house. Many houses in the country lack proper facilities for house drainage.

The methods of disposal of household drainage are discussed in the chapter on the disposal of sewage (page 66).

Disposal of human excrement. One of the most important items of sanitary inspection is the manner of disposal of human excreta. Particular note should be made as to the possibility of contamination of the water supply and as to the means taken to prevent the access of flies.

The methods of disposal of human excrement are discussed in the chapter on the disposal of sewage (page 66.)

Garbage disposal. Garbage consists of waste foods from the kitchen and dining room; it is often mixed with paper waste, tin cans, etc. It seldom contains disease germs or is a direct menace to health. It is important, however, to the sanitarian because it readily undergoes fermentation and putrefaction; and because it may be the breeding place for flies and may attract vermin.

The common methods of garbage disposal are: (1) feeding it to fowls and pigs, which is an economical method and more sanitary than if it were left to decay; (2) burial, either in the ground or in a manure pile, which is a sanitary method if the

garbage is covered to a depth sufficient to place it out of reach of flies; (3) incineration, which is the most sanitary of all methods when properly done; (4) reduction, or the recovery of fats and fertilizer which in some city garbage works pays for the collection.

In noting the methods of garbage disposal the following conditions are to be reported by a public health nurse as unsatisfactory: (1) garbage heaps in the back yard; (2) flies or fly larvae in the garbage; (3) garbage containers out of repair, or not properly cleaned; (4) absence of tight covers on the containers.

Barnyard conditions. Barnyards come under the supervision of health officials only in so far as they directly or indirectly affect health. In this sense they may be the breeding places for flies and mosquitoes, etc.; they may hinder the production of pure milk; they may be sources of water pollution; and they may become harboring places for rats and other vermin. They are not considered as direct sources of infection unless they are polluted with human excretions, but they may be contributory causes of disease and thus should be controlled by the health department.

Fly control. A nurse who is making sanitary inspections should look for the breeding places of flies, especially during the summer months. These are usually found in manure piles, garbage heaps, stables, privies and other places in which decaying vegetable or animal matter is deposited. Methods of fly control include the use of covered containers to prevent the access of flies to breeding places; the use of chemicals to destroy fly larvae and pupae in manure piles; and mechanical methods of protection from flies, such as screening traps, fly paper, etc.

The subject of fly control is discussed in the chapter on breeding places for flies and other insects (page 87).

Mosquito extermination. Mosquitoes breed in almost any collection of stagnant water, even though it be only a cupful or less. The discovery that certain kinds of mosquitoes are necessary to the completion of the life cycle of the organisms of malaria and yellow fever has made the control of their breeding places of great importance in localities where these diseases are prevalent. The annoyance caused by other kinds of mosquitoes which are not known to be disease carriers makes their extinction also very desirable. The same measures of extermination are effective against all varieties of mosquitoes. One of the most important

of these measures is the control of house drainage and rain water near dwellings. Any untreated collection of stagnant water in the summer time should be condemned on the ground that it may breed mosquitoes.

The subject of mosquito extermination is discussed in chapter VI (page 89).

Water supply. The source and character of the water supply is one of the most important items of sanitary inspection. A nurse should first inquire whether the supply is derived from a public or private source; if it is from a lake, stream, spring, open or driven well, or cistern. The character of the water may be best judged by an analysis of a sample and inspection of the surroundings and source. If there is evidence of contamination the well should be abandoned or the water from it boiled except that used for mechanical purposes. Public water supplies are under the control of the Division of Sanitary Engineering of the State Department of Health and their supervision is largely a technical problem, but a public health nurse may be required to assist in a sanitary inspection.

The elementary principles involved in securing and maintaining a pure water supply are discussed in chapter IV (page 50).

Milk supply. The principal conditions pertaining to milk which affect health are: (1) the health of the cow; (2) the presence of barnyard dirt which may enter the milk; (3) the changes which the milk usually undergoes; and (4) human disease germs, which may be introduced into the milk by the insanitary methods of those who handle it.

From a sanitary standpoint the modern circumstances which tend to increase the danger from milk are: (1) large routes of collection and delivery by means of which an infection at any one dairy is spread through a distributing center to a great number of customers; (2) long periods of storage and transportation by which the age of milk before delivery is increased; (3) the larger number of persons who take part in handling it; (4) the custom of distributing milk in bottles which are collected after exposure to contamination in the household and the resultant work and care necessary in the cleaning of the bottles.

To meet and solve the different problems of milk production

under these circumstances requires official supervision, and in addition the kind of popular education which a public health nurse is well fitted to give. A public health nurse may also be required at times to assist in inspecting and scoring a dairy.

The sanitary principles involved in securing and maintaining a pure milk supply are discussed in chapter III (page 38).

Food handling. A public health nurse may be called upon to inspect the methods of handling and storing food in houses, bakeries and at soda fountains, restaurants, markets, and other places where food is prepared and handled or sold.

Food may become contaminated during handling either from its environment or from the handlers themselves, the latter way being much more common. The principal points to be observed in the environment of food are: (1) the cleanliness of the room and containers; (2) the exposure of the food to flies and dust; and (3) the temperature at which the food is kept. The main points to be noted in persons who handle food are: (1) cleanliness of hands and clothing; (2) health, especially as to the existence of colds, coughs, sore throat, diarrhea and other communicable diseases; and (3) possibility of the presence of healthy carriers of disease. The latter are usually impossible to detect without a systematic search being conducted by trained health officials and laboratory tests made on specimens of discharges obtained from such suspected persons. A nurse should also observe whether food is to be eaten raw or cooked, as raw food is always to be considered dangerous if handled by unclean persons or in unclean surroundings. The heat of cooking usually destroys both disease germs and the bacteria of fermentation and decay. The nurse should not be deceived, however, by the cleanliness of the dining room or the attractiveness of the food on the table, but she should judge of the sanitary condition of the food in the storeroom and kitchen before it is cooked. Unclean cooks and kitchen equipment may infect food with disease germs which give no indication of their presence.

The chief points to be observed in food handling in homes are: (1) general cleanliness of the kitchen, pantry and containers, and of persons who handle the food; (2) presence of flies on food and of vermin in the kitchen and pantry; (3) temperature at which food is kept.

PLACES OF PUBLIC ASSEMBLAGE WHERE FOOD IS PREPARED, HANDLED AND SOLD

The handling of food is forbidden in certain cases by the State Sanitary Code (Chapter II, Regulation 39), as follows: "No persons affected with any communicable disease shall handle food or food products intended for sale which are likely to be consumed raw or liable to convey infective material. No person who resides, boards or lodges in a household where he comes in contact with any person affected with the bacillary dysentery, diphtheria, epidemic or septic sore throat, measles, paratyphoid fever, scarlet fever, poliomyelitis, acute anterior (infantile paralysis), or typhoid fever, shall handle food or food products intended for sale. No waiter, waitress, cook or other employee of a boarding house, hotel, restaurant, or other place where food is served, who is affected with any communicable disease, shall prepare, serve or handle food for others in any manner whatsoever. No waiter, waitress, cook, or other employee of a boarding house, hotel, restaurant, or other place where food is served, who lodges or visits in a household where he comes in contact with any person affected with bacillary dysentery, diphtheria, epidemic or septic sore throat, measles, paratyphoid fever, scarlet fever, poliomyelitis, acute anterior (infantile paralysis), or typhoid fever shall prepare, serve or handle food for others in any manner whatsoever."

Since it is not practically possible to insure that employees in establishments where food is prepared, handled or sold are not carriers of disease, *inspection* here is the only safeguard against infection.

During an epidemic or at any time that he sees fit, the health officer may detail the public health nurse to routine inspection of bakeries, soda-water fountains, restaurants, markets, and other places of public assemblage where food is prepared, handled or sold.

In making an inspection of an eating house the nurse should note the date, street, number, name of owner and proprietor, address and business; whether foods are exposed to flies and other insects, dust or dirt; whether the clothing of persons handling food is clean; and whether the business is conducted in a cleanly manner, especially as to the methods and thoroughness of dish washing, and should give details. She should note the construction

of the place where foods are sold or stored; if water-closet and lavatory are provided; if they are separate from the room where foods are sold or stored, and their condition; if cuspidors are provided and their condition, whether disinfectants are used; and if the store or storeroom is used as a dormitory. She should inquire as to the health of persons handling food; if they are in good health themselves; if there is any illness in their families; if there are cases of illness in persons who have been living or working on the premises but who have departed, their names, addresses and means of identification, and the extent of their contact with other persons to whom they might communicate the disease. When the facts point to infection of any particular place, the homes of cooks, waitresses and other employees should be visited.

If the disease may be water-borne and the mode of infection has not been determined, the source of the water supplies should receive special attention, and in the case of a spring or well it should be inspected in order to discover whether it is liable to become contaminated. If bottled water is used the brand should be noted, and if communicable disease is present on the premises, whether the empty bottles are returned to the dealer, and what, if any, measures are taken to prevent possible spread of infection. The presence of dogs and cats, with possible opportunity to convey infection, should receive attention and record.

If the disease may possibly be milk-borne the fullest details should be given concerning the source of the milk supply of both milk and ice cream, and the care of the milk and empty containers used on the place. When communicable disease is present milk and ice cream containers must be sterilized by methods approved by the health officer before they are returned. When laboratory specimens are desired the nurse will be required to secure these during her visit and forward them at once to the laboratory, together with a detailed report (on a blank form furnished by the State Department of Health) containing specific information collected during the investigation.

The instructions she gives should include suggestions regarding desirable changes to be made in methods and conditions, and the place should be subsequently inspected, when necessary, to see whether these conditions have been corrected. Revisits should

follow promptly when insanitary conditions are found, and be continued at frequent intervals until they are found to be remedied. Persistence, tact and courtesy will remedy a large majority of insanitary conditions without resort to compulsion.

In inspection of bakeries and confectioneries the above principles should be carried out, special attention being paid to cleanliness of habits and methods on the part of operators, and whether the bread and other food products are properly wrapped and protected against handling, dirt, dust and flies during transportation and while on sale.

At soda-fountains and other places where beverages are sold, the special points to be noted are cleanliness of methods, including proper washing of glasses and other utensils, and proper protection from fly and dirt contamination. Such glasses are used many times a day and should be accordingly most strictly looked after. Particular attention should be given to the rims of the glasses which have been experimentally shown to harbor numerous germs; after-washing in clean water is therefore important.

At markets, especially those in which produce usually eaten without peeling, paring or cooking is sold, special atttention should be paid to fruits and vegetables, whether they are protected against flies and contamination while on display or in transportation or storage, and whether they are kept on stands high enough above the ground to prevent the access of domestic animals.

Food poisoning. The Sanitary Code requires (chapter II, regulation 41) that if a public health nurse learns of the occurrence of a number of cases of severe or fatal illness believed to have been due to the consumption of articles of food suspected to have been spoiled or poisonous, it shall be her duty to report the same immediately, by telephone or telegraph when practicable, to the State Commissioner of Health and to the local health officer in whose jurisdiction the cases occur.

THE ABATEMENT OF NUISANCES

Nuisances. A nurse is not expected to undertake the abatement of nuisances beyond the limit of what can be accomplished by advice and appeal. But it is well within her province to make a thorough inspection of the premises, and if she finds any condi-

tion of nuisance which she is not able to have corrected by friendly advice or persuasion to report the case to the local health officer, who, as agent for the board of health upon whose action and direction the case depends, will proceed with its abatement in accordance with the Public Health Law and the procedure given in chapter VI of the Sanitary Code.

It is essential that the public health nurse be familiar with the subject of nuisances and the manner in which they are abated, although the responsibility for their abatement rests upon the health officer and the board of health.

Abatement. While the subject may be viewed from many angles, for practical reasons it will be helpful to look at it from only three, viz: classification of nuisances; statutory requirements to be met; procedure to be followed.

In regard to classification, nuisances may be considered under various groupings, as, for instance, those prescribed by the Penal Code; or as major and minor nuisances; or with reference to nature of the materials responsible for the nuisance, such as organic and inorganic; or with reference to the objects affected, such as a pollution of the air, soil or water. To the health official, however, the most important and practical classification would include, first, those nuisances which directly affect health; second, those which only indirectly affect health; and, third, those which may be considered as more appropriately falling under other municipal jurisdiction. These classes are obviously arranged in the order of their relative importance from the standpoint of health, though not necessarily in the proper order from other standpoints.

The first of these three important classes referred to — viz., nuisances which directly affect health — will include such conditions as cause infection of water supplies; infection of milk and other food supplies; the breeding of mosquitoes, flies and other infection carriers; in fact any condition which may be the source or vehicle of transmission of disease germs. Nuisances arising from such conditions are clearly of primary importance, and should be abated without question or hesitation, and strictly in accordance with the procedure laid down by the Public Health Law and the Sanitary Code.

The second class of nuisances, those which indirectly affect health, will include a variety of objectionable conditions which only in an indirect way may be associated with disease transmission, but which do offend the senses, disturb the digestion or nervous system, and in these and other ways indirectly affect health. Under this class may be cited odorous and unsightly piles of decaying vegetables, fruits and other organic but noninfectious materials; odors from privies the contents of which may not be exposed or even accessible; obnoxious gases and fumes from chemical and other industrial plants; garbage and manure piles; dirty pig pens and fowl yards, etc. In all these cases and with the limitations stated, there is no direct opportunity for disease transmission. The effect upon the senses may be offensive and even sickening, but not productive of specific disease. In other words, these nuisances only indirectly affect health. Numerically, it is the largest class a health official has to deal with, but unfortunately it is the one of which the ordinary layman usually, but erroneously, exaggerates the importance from the health standpoint.

This kind of nuisance is frequently the most difficult for a health officer to dispose of, and it is one where he should err, if at all, on the side of safety in regard to the necessity for abatement. He should not dismiss such a case from his mind or fail to act merely because it is not a direct menace to health. It is an actual nuisance from the standpoint of offensive odors, unsightliness, or of even ordinary decency, and he should have it promptly abated. Tactful discrimination, moral suasion and appeal to civic pride and justice will usually be sufficient to accomplish this. It is important to remember also that in dealing with any case which may be scientifically questionable as to its effect upon health, the health officer can always fall back on the argument or principle of its indirect effect, be it nausea, discomfort, lack of sleep or rest, or the irritation and depression of the nervous system. In brief, the health officer should make up his mind, without prejudice, whether the case is one which upon its full merits should be abated, and then should proceed with its abatement. If the case should go to court the judge will usually be on the health officer's side, for judges fortunately are generally both human and fair minded.

The third class of nuisances referred to,— those which more appropriately fall under other municipal jurisdiction,— will include those cases which, though they may in some respects indirectly affect health, yet are of such a nature as to come wholly or in part under police or other authority. This class includes howling dogs and cats, blasting, motorboat and automobile exhausts, unsightly fire ruins, powder magazines, dangerous excavations, etc. Even smoke nuisances are by some authorities considered outside the province of health authorities, in large cities quite properly so. Many of these have special smoke ordinances and special smoke inspection. In dealing with nuisances of this class the health officer usually finds it more effectual to turn them entirely over to the police or other proper authorities, or at least to act in cooperation with these officials.

As to the question of statutory requirements, the principal thing to remember is that there are certain classes of nuisances which, owing to their scientific aspect, or their being outside the territory of local jurisdiction, concern more the State Department of Health than the local board of health; in particular those provisions of the law which cover sewage and industrial waste discharge and the abatement of violations of rules and regulations enacted by the State Commission of Health for the protection of public water supplies from contamination. In all cases of sewage and waste discharge into streams, except perhaps individual house drains, the State Commissioner of Health has direct jurisdiction under Sections 76-84 of the Public Health Law. All such cases should be referred by the health officer to the State Department of Health for disposition. In the case of a private drain, where a local nuisance is created, the health officer obtains more prompt and effective results by considering it as falling under Class I or II and applying the corresponding procedure in its abatement.

In cases of violation of water rules affecting public water supplies the special provisions of Sections 70–73 of the Public Health Law apply. These cases involve a very specific and complex procedure for abatement. The health board is involved at only one stage of this procedure, and since the board must act in accordance with specific orders from the State Commissioner of Health,

the health officer should refrain from any action whatever until such explicit orders, which are always self-explanatory, are actually issued.

With these two exceptions then, the abatement of all nuisances which involve action by the local health officer will fall under Sections 21, 26, 31 and 32 of the Public Health Law and Chapter VI of the Sanitary Code; this brings up at once the final question, procedure. It is essential that the health nurse should read Chapter VI very carefully, for these sections provide not only the authority but the definite procedure which the health officer must follow in the abatement of all nuisances within his jurisdiction. It should be remembered that Sections 21, 26, 31 and 32 give full authority to investigate and abate nuisances and Chapter VI of the Sanitary Code outlines the definite procedure to be followed.

In the ordinary routine of abatement of nuisances it will, of course, only occasionally be necessary to resort to any formal proceedings, since mere suggestions and advice, fortified perhaps by tact and diplomacy, will usually accomplish results without coercive means. If, however, the case is important, or appears in any way stubborn, the health officer should be notified and he will usually take the formal procedure outlined in Chapter VI of the Sanitary Code and follow it step by step. This course will not only at once make a strong impression upon the offender, but it will protect the health officer from any embarrassment that may possibly arise from any subsequent court proceedings.

Should a case be referred directly or on appeal to the State Department of Health, it will still fall under Chapter VI of the Sanitary Code and will usually be first referred back to the health officer for action. If the health officer fails to act, or if the Commissioner reverses the decision of the local health board, the Commissioner will probably issue an order under Section 26 of the Public Health Law which is enforceable by mandamus proceedings. It will be seen, therefore, that Chapter VI of the Sanitary Code, furnishes a procedure which is to be followed not alone by the health officer, but also by the State Commissioner of Health; Sections 1, 2 and 3 furnishing the procedure to be taken by the health officer and health board in those cases which are disposed

of by the local health board without intervention of the State Department of Health; and sections 4, 5 and 6, the procedure by the local board and the State Commissioner of Health in cases which are referred to the Department directly, or on appeal.

In dealing with nuisances, then, it is essential to know these provisions of the law thoroughly, and to follow them explicitly. There is one feature, however, in the application of these laws about which one should be cautious and that is in the application of forceful means in the abatement of a nuisance. Sections 31 and 32 of the Public Health Law empower the health officer to enter property and by forceful means to abate any nuisance. These means, however, are rarely resorted to except in extreme cases, if at all. The simpler and more effective method will nearly always be to take the case into court and impose a fine or secure an injunction or both. This method will avoid serious personal enmity, insure a fair trial and leave a more salubrious moral impression upon other possible offenders or upon the community at large, than where martial law, as it were, is declared and forceful entry and possible destruction of property is resorted to.

CHAPTER III

PURE MILK SUPPLIES

The Sanitary Code of the State of New York prohibits the sale of milk at retail without a written permit from the health officer of the municipality in which the milk is sold. This permit must be renewed annually. The health officer or his representative is required to make a yearly inspection of every dairy farm where milk is produced for sale at retail within his district, after receiving an application for a permit, and to score such dairy farms on scorecards prescribed by the State Commissioner of Health. The health officer may accept at his discretion the inspection and scoring by the health officer or his representative of another municipality, including New York City. The regulations governing the production and sale of milk and milk products may be found in Chapter III of the Sanitary Code, and in various sections of the Agricultural Law (sections 30 to 104).

It is improbable that a nurse would be assigned to regular inspection and scoring of dairies, but in the presence of an epidemic of communicable disease she may be called upon to assist the local health officer in the inspection of all places offering milk for sale at retail. The public health nurse may be required also to make an investigation of conditions existing on some particular dairy farm or farms if an outbreak seems to be milk-borne, or to inspect dairies maintaining insanitary conditions. When making such investigations her duties will consist in verifying the statements of the producer that the regulations to be observed, if the milk is offered for sale, are being strictly carried out, and in certifying to the local health officer the conditions found, the methods of disposal of the discharges of sick persons, the opportunities for flies to convey the infective agent of the disease to the milk supply, etc. She is also expected to give special instructions to the family as to methods of conducting the isolation period of a communicable disease in the home. The nurse may be assigned to go from house to house in certain districts during an epidemic, giving instructions to those who desire or need it, as to the proper method of caring for milk in the home. In the

summer or during the presence of an unusual amount of diarrheal disease among children this is very important. When needed she should help the family construct a cheap ice box such as is described at the end of this chapter, and assure herself that containers are sterilized before being returned to the retail dealers. No milk bottles should be permitted to leave a house while an inmate is ill of any communicable disease without sterilization by methods approved by the health officer.

When searching for the source of typhoid fever apparently milk-borne, the nurse is required to visit farms or dealers to see if any persons are ill with, or convalescent from, typhoid fever, or give a history of a previous attack of this disease, or of an illness suggesting but not recognized as an attack of typhoid fever. The nurse is also expected to inform herself concerning the existence of a milk station in the neighborhood which may be shipping milk to another municipality, in order to determine whether there is any possibility of that milk supply being contaminated.

In order, therefore, to carry out these investigations and instructions for the control and prevention of disease caused by milk, the public health nurse should be informed as to the principal facts upon which is based the production of a pure milk supply.

Impure milk is perhaps responsible for more sickness and death than all other foods combined. The reasons for this are: (1) bacteria grow well in milk; (2) of all foodstuffs milk is the most difficult to obtain, handle, transport and deliver in a clean, fresh and wholesome condition; (3) it is the most readily decomposable of foods; and (4) it is the only standard article of diet obtained from animals which is habitually consumed in its raw state. About 16 per cent of the average dietary in the United States consists of milk and milk products. Fresh milk products made from infected milk may be nearly, if not quite, as dangerous as the milk itself. Milk, properly modified, is a perfect food for the suckling and is so largely used as food by adults as well as infants that there is every reason to encourage the production of pure milk and to discourage and prevent the marketing of impure milk.

Quality of milk. The qualities by which milk is judged are its freshness, purity, cleanliness and wholesomeness. Milk is said to be fresh when its condition and composition are the same as when

it was drawn from the cow. Milk is pure when it is fresh and clean, that is, when its condition and composition are unchanged and it is not contaminated with foreign substances. When milk is fresh, pure and clean it is wholesome.

Bacteria in milk. Milk as it comes from a healthy cow is usually wholesome, but it readily undergoes changes, due principally to the action of bacteria which enter the milk after it is drawn from the cow, that render it unwholesome. The bacteria ordinarily found in milk are: (1) those producing lactic acid; (2) those causing fermentation and putrefaction; (3) the germs of human disease; and (4) beneficial and inert bacteria.

Lactic acid bacteria decompose sugar, changing it to lactic acid which is a harmless product. The bacteria of putrefaction change proteins to substances which may be detrimental to health, especially in infants. The germs of human diseases if introduced into milk may live and multiply, producing the disease of which they are the infectious agents in those who drink the milk. Not all bacteria are harmful. Some produce beneficial changes in milk, such as those which give the agreeable flavors to butter and cheese; others bring about no apparent changes in milk or its products.

Impaired quality in milk is chiefly due to the following changes: (1) souring or lactic acid fermentation; (2) coagulation or curdling; (3) unpleasant tastes and odors; and (4) the presence of bacteria in excess.

Souring is the most common change which takes place in milk and is due to lactic acid bacteria. Sometimes when milk or cream is kept too long, even at a temperature which prevents souring, putrefactive changes may occur which will render it unfit for food.

Coagulation is produced when a considerable quantity of lactic acid is present in milk the lactic acid uniting with the phosphates which hold the protein in solution, so that a semi-solid curd or casein is formed. Milk may be curdled also by artificial ferments such as rennet. Curdled milk obtained from clean milk, if kept under clean conditions, is a wholesome food.

Slimy or ropy milk. Certain bacteria growing in milk may produce mucilaginous substances. The entire milk product of a dairy has been known to become viscid in this way. Though such milk is considered a delicacy in some countries, in this country it is not so regarded. It is not injurious, however, from a standpoint of health, unless it is slimy as a result of diseased conditions in the mammary glands.

Thin and watery milk is produced at times by bacteria yielding ferments that dissolve and decompose proteins. The products of this decomposition are often harmful.

Tastes and odors. Unpleasant tastes and odors in milk are usually caused by: (1) dirt in the milk; (2) certain foods of cows, like turnips or wild garlic; (3) the action of bacteria causing fermentation and decay. Tastes and odor due to food may be reduced or removed by the process of aeration when the milk is run in a thin film over the cooler. Unpleasant tastes are often evidence of the presence of harmful bacteria.

The harmful effects caused by milk used as food are produced either by unwholesome chemical compounds developed in the milk, or by human disease germs introduced into it. Chemical products affect health within a few hours after the milk is taken into the body. Sickness caused by disease germs in milk does not develop until the expiration of the period of incubation of the disease,— that is to say, from a few days to a week or more, during which time many persons may become infected. Disease germs rarely if ever produce changes in milk which are recognizable, and the first manifestation of their presence is usually the development of the disease in a number of persons who have been using the same milk. Under these circumstances the milk should be held under suspicion and an investigation made to determine the cause. Investigation of the quality of a milk supply is always required when tracing the origin of an epidemic.

Bacterial count. Almost all of the harmful effects due to milk are the result of bacterial action. One of the most reliable indications of the quality of milk is the number of bacteria present in each cubic centimeter. This number is estimated by a bacterial count which is the basis upon which milk is usually graded by boards of health. All milk contains some bacteria — the best

milk on the market a few thousands, ordinary milk hundreds of thousands, and poor milk millions of bacteria in each cubic centimeter.

A sample of milk for a bacterial analysis is taken in a sterilized container which holds about half an ounce. The milk is first stirred or shaken thoroughly in order to distribute the bacteria uniformly. The bottle is then nearly filled and aseptically sealed, the container is surrounded with ice to prevent the bacteria from growing and is forwarded promptly to a laboratory as soon as possible.

A bacterial count does not indicate the total number of bacteria present in a sample of milk, but only the number of bacteria that will develop colonies in the culture medium employed, and at the temperature and within the given period of incubation. The standard methods of counting are those which have been adopted by the American Public Health Association, experience having shown that these methods give the most uniform results and afford a fairly reliable indication of the quality of the milk.

Adulteration of milk. The common adulterations of milk are: (1) skimming; (2) watering; (3) thickening agents, coloring matter, alkalies, sweet substances; and (4) chemical preservatives.

Skimming or removal of part or all of the cream and selling the balance as whole milk is fraud but has no reference to health, except that the milk is lowered thereby in nutritive value. Adding skimmed milk is also a form of adulteration often difficult to detect. Watering milk, if the water be pure, is also to be regarded more as a fraud than a health problem. The addition of water to milk lowers its specific gravity, raises its freezing point and also lowers its viscosity. Thickening agents such as chalk, calves' brains or glycerine are not commonly used. Coloring matter, such as annato (a vegetable dye) is sometimes added to milk with the object of concealing skimming or watering, or to make the milk look richer. Alkalis, such as sodium carbonate or bicarbonate, are occasionally added to milk to reduce its acidity or to delay curdling. Sweet substances, such as saccharine and sugar, are sometimes added to milk either to raise its specific gravity and thus disguise watering or to disguise the sour

taste of milk just on the turn. Chemical preservatives, such as borax and boric acid, salicylic acid, benzoic acid and benzoin, peroxide of hydrogen, formaldehyde, etc., have been used in milk. No satisfactory chemical preservative for milk has been discovered which will kill the bacteria or prevent their growth without injuring the milk. Almost all states and countries prohibit the use of such foreign substances.

Dirty milk — the dirt test. Practically all milk contains some dirt. Milk that contains visible dirt nearly always has a high bacterial count. A rough test for visible dirt is to observe the sediment deposited on the bottom of a milk bottle or other container. The presence of dirt may be more accurately determined by the sediment test, which consists in filtering a pint of milk through a little disc of absorbent cotton. This leaves a stain varying in intensity from a yellowish to a brownish or black spot. A good crucible, a Lorenz apparatus, or simply an ordinary funnel may be used to filter the milk. Ordinary milk will usually leave a considerable number of visible specks of dirt in the cup. Warm milk filters more rapidly than cold milk. The sediment test is one of the most practical of the routine tests used for the public health control of milk supplies. It may be made use of in educating farmers and dairymen as well as consumers regarding the relation of cleanliness to the wholesomeness of milk. The discs may be dried and kept with the records of the dairy in the health office. Milk that has been "clarified" or strained of course will not show a sediment.

Composition. The composition of milk is exceedingly complex. It consists chiefly of water, several proteins in suspension, fats in emulsion, sugar and a number of inorganic salts in solution; also ferments as well as antibodies, cells, gases, etc. The market value of milk depends upon the quantity as well as the quality of its various food elements, particularly protein, fat and sugar. The percentage of these three elements are of special importance in calculating the diet of infants. Experience has shown that reliable results are obtained when the percentage of cow's milk is taken to be 3.5 per cent protein, 4 per cent fat and 5 per cent sugar. Since milk varies in composition, minimum standards have been set by law. The standard of New York State is that milk shall con-

tain at least 3 per cent of fat and 11.5 per cent of total solids. The sale of milk below this standard of composition is illegal (Agricultural Law, section 30).

Test for fat. There is accurate test for the amount of fat which is known as the "Babcock Test." It depends upon the fact that sulphuric acid added to milk acts upon the protein and liberates the fat, which then floats on the mixture when its amount may be measured.

Specific gravity test for adulteration. Milk containing the legal amount of fat and solids will have a specific gravity of 1.030 to 1.034. The specific gravity test is usually made with a special bulb called the "lactometer," but an ordinary urino-meter may be used. Fat being lighter than the rest of the milk if it is removed the specific gravity of the skimmed milk will be more than 1.034. The addition of water to milk lowers the specific gravity below 1.030. A specific gravity of more than 1.034 thus indicates that the milk has been skimmed, while a specific gravity below 1.030 indicates that it has been watered. Taking the specific gravity of the whole milk does not of itself detect either skimming or watering, since if these practices are done artfully, the specific gravity of the milk may remain unchanged. If these are suspected, therefore, from the appearance of the milk, further laboratory tests are required.

Total solids. The laboratory test for the determination of total solids is by evaporation and direct weighing of the dried residue.

Wholesome milk. The four main conditions which must be observed in the production of wholesome milk are: (1) that it be taken from healthy cows; (2) that it be handled by healthy dairymen; (3) that it be produced by clean methods; and (4) that it be preserved as nearly as possible in its original state of purity.

Diseases spread by milk. The diseases most commonly spread by milk are: tuberculosis, typhoid fever, diphtheria, scarlet fever, septic sore throat, malta fever and foot and mouth disease, also some of the summer complaints of children and the diarrheal and dysenteric diseases . adults. These are often traceable to infected milk.

Diseases of animal origin. As a rule milk becomes infected from human sources, sometimes on the farm, sometimes at the

dairy, sometimes in transportation and occasionally in the household. Not infrequently the milk becomes infected as a result of disease of the cow, as in the case of bovine tuberculosis.

Bovine tuberculosis. This is the most common disease which may be transmitted from cows to human beings. Children, it is now known, are particularly susceptible to the bovine type of tubercle bacillus while adults are not. The principal organs which are affected with this form of tuberculosis are the lymph glands of the neck and the abdominal organs, the lungs, the bones and joints.

Tuberculosis is so common among cows that sometimes nearly all animals in a herd are infected. The disease may be recognized in cows by three methods: (1) physical examination; (2) finding tubercle bacilli in the excretions; and (3) by the tuberculin test. Every cow found to be tuberculous is to be considered as a possible menace to public health. The laws of New York State require that all cows known to be tuberculous shall either be killed or kept under conditions prescribed by the State Commissioner of Agriculture. (Agricultural Law, section 94.)

It is a very difficult matter to discover tubercle bacilli in milk. The measures resorted to in order to secure a milk supply free from living tubercle bacilli are as follows: (1) the detection of tuberculous cows and their exclusion from the herd; (2) cleanly methods of milk production; and (3) the pasteurization of all milk. The latter is the only method upon which complete reliance can be placed.

Diseases of human origin spread by milk. Milk is a culture medium favorable to the growth of disease germs. Cases of milk-borne disease frequently occur singly or in epidemic form, depending upon the number of persons using the infected milk. The germs are usually conveyed to the milk by those who handle it, and the source of the infection is either the discharges from the nose and throat of such persons in coughing or sneezing, or the dairyman's hands soiled with these discharges or with the excretions from the intestines of the cattle. Milk-borne epidemics of diphtheria, scarlet fever and septic sore throat are common.

The communicable diseases mentioned in the Sanitary Code of New York State as being likely to be transmitted by milk are:

diphtheria, septic sore throat, amebic or bacillary dysentery, epidemic cerebrospinal meningitis, scarlet fever, smallpox, typhoid fever, paratyphoid fever, acute anterior poliomyelitis and cholera.

When a case of one of these diseases occurs on a farm or dairy producing milk or milk products, the code specifies that no milk or dairy products shall be sold or delivered unless the conditions required are observed, or a permit be issued by the local health officer allowing the food to be sold or delivered. As a preventive measure an efficient inspection service strikes at the root of the milk problem. But inspection has its limitations; it can not detect disease carriers or mild cases of diseases, and inspectors can not be on hand at all places at all times. An essential factor of a successful inspection is the scorecard system.

The scorecard system. The common standard by which the wholesomeness of milk is judged is the bacterial count. A low bacterial count is dependent upon the exclusion of dirt from the milk and cleanliness in every stage of its production. The sources of dirt and bacteria in any given milk supply can only be discovered by a careful inspection of the dairy and close observation of the methods which are followed in handling the milk. The points to be noted in making such inspection are indicated on the official scorecards which have been adopted by various departments of health. The scorecard should be used in inspecting dairies, but dairy scores are an imperfect means of judging the quality of the milk produced as determined by bacteriological tests. The omission of a single sanitary measure such as cleaning the udder of a cow may cause the milk to have a high bacterial count even though the total score of the dairy may be good. The principle upon which scoring is based is that of cleanliness of everything surrounding the milk, including dairymen, cows, stables, milk room and utensils.

Pasteurization. The measures taken for the production of milk with low bacterial count are: (1) preventing bacteria from entering the milk; (2) preventing bacteria from growing and multiplying in milk; and (3) killing the bacteria in the milk. The measures adopted for preventing bacteria from entering the milk have already been referred to. The only practical method of killing

bacteria in milk is the application of heat; the prevention of their growth and multiplication is effected by the application of cold.

Milk may be preserved by boiling as in the canning of fruits and vegetables. This is the process used in making condensed or evaporated milk; but boiling and evaporation changes the composition and taste of milk. It is preferable to sterilize the milk without changing it to any extent. The process of pasteurization does this by the application of a low degree of heat for a considerable length of time. The standard of pasteurization adopted by the New York State Department of Health is the exposure of milk to a temperature of 142°–145° F. for not less than 30 minutes. This degree of temperature and period of time are sufficient to kill pathogenic bacteria as well as those which are peculiar to the intestinal tracts of cows without changing the composition and taste of milk. Immediate rapid chilling of the milk to 50° F. or lower is essential. One test of efficiency in pasteurizing is a comparison of the bacterial count before and after pasteurizing. Another test is the absence of colon bacilli in the pasteurized milk, for colon bacilli derived from manure are usually present in all raw commercial milk.

When a milk-borne epidemic breaks out it may become necessary to pasteurize an entire milk supply to make it safe for use.

An emergency method of pasteurization is to place the cans in a tank of boiling water, stirring the milk continually to distribute the heat, testing with a thermometer, and removing the cans when the temperature reaches 145° F. If the cans are placed in a warm room the temperature of the milk will be retained at about 140° F. for half an hour. Prompt cooling should follow.

The home pasteurization of milk is sometimes desirable when infant food is to be prepared, or a milk-borne epidemic is threatened. For this purpose the milk may be heated in a double-boiler, stirred until its temperature by the thermometer reaches 145° F. and then placed on the back of the stove, where it remains at 140° F. for 30 minutes, after which it should be promptly cooled. To correct any possible tendency to rickets in children fed exclusively on pasteurized milk, orange juice is given.

Cooling milk. The only practical method of restraining the

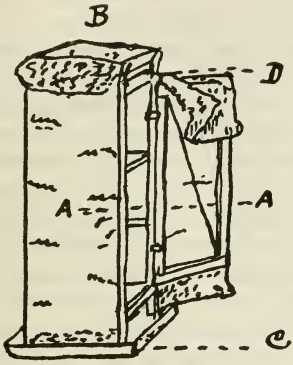
growth and multiplication of bacteria in milk is by cooling the milk as soon as possible after it is drawn from the cow and keeping it cool during storage and transportation. Milk is commonly cooled by allowing it to run in a thin film over a cooler containing cold water or ice. A flat cooler enclosed in a case is preferable to the cone-shaped container often used, as the latter is liable to become contaminated with dust or flies. A method of cooling milk frequently adopted on farms and at small dairies is to place the cans in cold spring water. The purity of the water in such cases is of great importance, as some of it may enter the can.

Grading milk. Milk is graded by its quality and not by its composition. The grades are determined by scoring the dairy or by a bacterial count, or sometimes by a combination of both methods. The grades of milk which are recognized by the New York State Department of Health and the basis of the grading are given in the Sanitary Code of the State (chapter III, reg. 13).

Permits. Permits issued by a health officer are required for the sale of milk in this State. These permits are issued after an application has been filed with the health officer by the dealer and every dairy from which his milk is obtained is inspected by the health officer or his representative. While the system of permits does not insure a pure milk supply, it affords a means by which unsatisfactory dealers may be controlled and both consumers and producers may be educated in matters regarding wholesome milk.

Procedures with suspected milk. Should a sample of milk be suspected to be unwholesome and be brought to the attention of a public health nurse, she may adopt the following procedures: (1) inspect the conditions under which the milk has been kept after delivery, since changes may have been brought about in the milk by conditions for which the buyer or consumer is responsible, such as time and temperature of storing, the manner of storage, etc.; (2) place the sample in plenty of ice and send or take it at once to a laboratory for examination, stating the condition under which the sample was obtained; (3) trace the milk to the dealer and dairyman, and ascertain the conditions under which it was produced and delivered; (4) keep a detailed record of all information obtained and report it to the health officer.

The iceless ice box. A refrigerator without the use of ice can be conveniently constructed by enveloping a screened set of shelves in a canton-flannel jacket which can be buttoned around it and kept moistened by wicks of the same material placed in a pan of water on top of the box, moisture from the pan being allowed to drip on the sides of the box and keep the enveloping flannel moistened — as shown in the drawing. The evaporation of this



A Box of screened shelves.
B Pan of water on top of box.
C Pan beneath box for drippings.
D Canton-flannel jacket kept moistened by wicks of same material.

ICELESS REFRIGERATOR

moisture will, in a relatively dry climate, maintain a temperature of about 50° F.* in the ice box and make the use of ice unnecessary or help to preserve ice that may be used. Keep in a shady place, where the air circulates freely.

* While this temperature is not low enough for prolonged storage, it is sufficient to keep food and milk for a short time, as is often done in a cool cellar.

CHAPTER IV

Pure Water Supplies

The securing of pure water supplies for human use constitutes a specialty in engineering, but a public health nurse may be called upon to assist in the work. If in his judgment it is desirable a health officer may utilize the services of a nurse employed by the board of health in the investigation of specific instances of suspected pollution of water supplies. Such instances will probably be confined to the investigation of conditions surrounding farmhouses, shacks and temporary colonies of people where typhoid fever, dysentery or other water-borne diseases may be communicated through careless disposal of human excrement, or where a carrier may be suspected or known to be found. The nurse may thus be expected to report on the location and number of cases of the disease or of known or suspected carriers, the method of the disposal of their excrement and present an accurate description of the conditions which suggest possible contamination of the water supply. This report might well include a sketch or map showing the location of wells and springs, streams and other sources of the water supply, and their distance from and relation to the place where the contaminating agent is deposited.

It is essential, therefore, that the public health nurse should know what a pure water supply is and how to recognize it, and for this reason she should be familiar with the rudimentary principles which control the production of pure water on the one hand, and with the simpler methods of sewage disposal on the other.

Pure water. The importance of having pure water in the home is axiomatic. Public water supplies are usually beyond the scope and ability of the nurse to control, but in small or rural communities where public water supplies do not exist, or where, if they do exist in part, recourse is often had to wells and springs for drinking purposes because the water is colder, it becomes of great value to the public health nurse to have some definite knowledge of the principles governing the securing of pure water, as the pollution of these sources is common and can often be remedied by comparatively simple means.

The quantity of water which is used in a household varies according to circumstances. Five gallons of water per person daily is considered to be a very small amount in a household that has no plumbing. If a house is provided with running water, a bath room and flush toilet, at least twenty-five gallons per person will be used daily for all purposes. In cities the quantity of water supplied is from seventy-five to three hundred gallons daily per capita.

The term " pure water " as applied to water supplies is difficult to define in a strictly scientific manner. To all intents and purposes a pure water is one the use of which for drinking purposes will promote health rather than cause disease. A water to be pure and suitable for potable purposes should be clear, colorless, odorless, palatable, and free from metallic poisons and from disease germs.

The only water which approaches chemical purity is that which has been freshly distilled. All so-called pure waters contain a considerable amount of substances dissolved in them, such as gases and minerals of various kinds. The substances that are found dissolved or held in suspension in water may be harmless foreign substances or dangerous impurities. A foreign substance which is harmful or objectionable is called an impurity.

Hard water. Hard water is that in which a considerable amount of lime or magnesia is dissolved. These minerals do not make the water unwholesome, but they are objectionable in household water, as soap does not lather well in such water, forming insoluble compounds with the salts of lime and magnesium, which float as a scum on the surface or become entangled with the meshes of the cloth in washing. Hard water is thus not desirable for bath or laundry purposes. Water which contains 50 parts or more per million of hardness is usually classed as hard. Hardness in water is of two kinds, temporary and permanent. The lime or calcium carbonate is much more soluble in the presence of carbon dioxide and when a water containing lime held in solution by carbon dioxide is boiled the lime is precipitated out, due to the driving off of the carbon dioxide. The hardness thus driven out of solution by boiling is called temporary, while the remainder is called permanent.

Iron. Iron in a water supply is frequently derived from minerals in the soil, but it is sometimes due to corrosion of water pipes. Iron is not unwholesome in water, but if present in any considerable quantity (one part or more of iron in one million of water), it renders the water undesirable for bath or laundry work. One remedy for iron in water is to allow the water to stand in the tank or reservoir for some hours, and then drain off the clear water on top without the sediment.

When water contains a large proportion of iron, a micro-organism called *crenothrix* may grow in it and form a jelly-like coating inside of the pipes and tanks. Pieces of this growth may break off and float in the water, or may die and impart to it an unpleasant taste or odor, or may form a scumlike oil on the surface of the water. It is, however, harmless to health.

Impurities. Impurities in water may be divided into those which make it unsafe for internal use, as in drinking and cooking, and those which render it unfit for external use, as for bathing and laundrying, cleaning, etc. A public health nurse is mostly interested in the unsafe impurities which are found in drinking water, as these have direct effect on health. It is unsafe, however, to use an impure water for any purpose in a household, as there is always a risk of some of the water getting into the mouth. Water that is discolored, or cloudy, or deposits a sediment, or has an unpleasant taste or odor, should be regarded with suspicion and as unsafe to use, unless it has been proved to be safe. At the same time, not all water that is apparently clean, bright and sparkling, is safe as such water may contain invisible germs of disease.

Again, impurities may be classified according to their character into physical, chemical and bacteriological impurities. Physical impurities are those which are suspended in water, such as iron rust, particles of clay and mud, shreds of wood, leaves, etc., the presence of which is indicated by the turbidity of the water. They are themselves seldom harmful to health, but their presence is an indication that harmful substances may also be present. Chemical impurities are those which are dissolved in water, such as mineral impurities, partially decomposed organic matter and ptomaines, etc., produced during the process of decay. Mineral matter in water seldom affects health except in the case of metallic poisons,

such as lead. Organic matter in water and the products of its decomposition are rarely harmful in themselves unless the water is grossly polluted with them. Of all impurities found in water by far the most important in relation to their effect on health are bacteria. Water can cause disease only when living bacteria of disease or some metallic poison are present in it. These bacteria are so minute as to be invisible and the clearness of the water is therefore no indication that they may not be present. The chief diseases which may be transmitted to human beings by means of water containing bacteria are typhoid fever, paratyphoid fever, dysentery and cholera. Tubercle bacilli and rarely found in a water supply, but their existence is possible if the water is grossly polluted from a case of tuberculosis. The principal impurities in water to be guarded against from a public health standpoint are the excretions of human beings, especially of persons who give off disease germs. The harmful impurities include sewage, household drainage, the contents of cesspools and privies, and other collections of matter containing human excretions.

Detection of impurities. Impurities in water are detected: (1) by a sanitary inspection of the source of the water and its environment; (2) by a chemical analysis; and (3) by a bacteriological analysis. All of these methods must be applied in order to form an accurate judgment of any given water supply. The omission of any one of them may lead to a false conclusion.

A public health nurse, in making a sanitary survey of the source of a water should inspect: (1) the source itself; (2) the method of collecting and distributing the water; and (3) the presence of sewage and other human pollution, such as cesspools and household drainage.

Water supply. Water supplies may be classified according to their sources into (1) rain water; (2) surface water, as that from streams and lakes; and (3) underground water from wells and springs. Each source of supply has its own particular problems for solution.

Rain water. Rain water is usually collected from roofs and stored in underground cisterns. Theoretically, water as it falls through the air contains the least amount of foreign matter of all natural waters. Cisterns often contain considerable amounts of

foreign matter, however, the sources of which are for the most part: (1) dust and bacteria from the air; (2) dust, dirt and excrement of birds from the roofs of houses; (3) dust and dirt entering through the covers of cisterns; (4) substances dissolved from the masonry of the cistern. The remedy for dust and dirt coming from the air and collecting roofs is to discard the first water which falls during a shower and to collect only that which falls after the roofs have been washed off. A simple device may be attached to the main conductors by which the water may be turned off and on to the cistern. The most important impurities in cistern water from a sanitary standpoint are those which get into it from improper protection; gross pollution may enter the cistern in this way. The nurse should especially note the following conditions about a cistern: (1) tightness of the cover and its ability to exclude earth worms, bugs, sand and waste water; (2) provision for conducting waste water away from the vicinity of the cover; (3) permeability of the sides to sewage and ground water; (4) practice of washing hands and soiled articles of clothing, etc. at the cistern; and (5) frequency and care with which the cistern is cleaned.

Rain water, being soft, is suitable for use in the laundry. On the whole, however, it is not considered as practicable for general domestic use as good surface or ground water.

Surface water. The water of springs, rivers and lakes in uninhabited regions is naturally pure and wholesome, except during times of flood when it becomes turbid. Even then it will not contain the germs of human diseases, unless polluted with the excretions of human beings. A safe water supply for a household must be derived from an uninhabited region, or the water must be purified before it is distributed.

The possible sources of pollution of streams, rivers or lakes are determined by a sanitary survey of the watershed in order to discover: (1) the presence of sewage and drainage from premises that are occupied or used by human beings; and (2) the probability of any objectionable material entering the water. The principles are the same whether applied to a small stream on a hillside or a large river. The points to be investigated are:

(1) The topography: The height and direction of the slopes of the land; the existence of valleys and tributary streams leading to the water; the character of the soil.

(2) The presence of sources of pollution: Houses, tents, shacks and workshops used by human beings; barns, stables and enclosures for domestic animals; cultivated fields and manure piles; drainage from highways; sewage disposal plants and dumping places for rubbish.

(3) Systems of sewage disposal: Sewers and privies emptying directly into the water; cesspools, privies, and household drainage, their efficiency and the care given them; existence of gross soil pollution.

In making such a survey the following conditions must be taken into consideration: The dry season, the period of floods, and the time of frozen ground. Sewage deposited on frozen ground during the winter may be released suddenly in the spring by a thaw and carried to a water supply, which at any other season of the year could not be reached.

Underground water. Ground water that is clear and pleasant to the senses will practically never contain foreign substances harmful to health, unless it is polluted with human impurities. A sanitary inspection of the well and its surroundings will nearly always show the probable source of any such impurities, if there be any present.

In the case of springs and wells in limestone, it is difficult to determine from the sanitary survey alone whether opportunities for pollution exist or not, on account of the existence of far-reaching channels and crevices in the rock formation.

Impurities may enter the well itself, or the containers, or pump with which the water is drawn or they may reach the water by seepage through the soil.

Wells. Wells are of two kinds, dug and driven wells. The usual form of dug well consists of a pit 3 or 4 feet in diameter, lined with brick or stone and open at the top. It is exposed to pollution from substances falling into its open mouth or penetrating the joints of its lining. A driven well consists of a pipe of iron or tiling sunk down to the underground layer of water. It is thus protected from substances falling or entering into it through its sides. If properly constructed this form of well furnishes water as pure as the underground stratum of water from whence it is drawn.

The requirements for a safe well are (1) that it be in itself a safe source; and (2) that it be protected by proper construction from possible contamination. In order to be safe in itself, the well should be located so that the drainage from a privy or cesspool or any other underground repository of human excreta and washings can not drain toward the well; or, in case it does, that the distance of the well from such source of pollution and the character of the soil be such that the drainage shall be completely purified during its passage through the soil.

The first point for the public health nurse to take into consideration in inspecting a well should be the possibility of *subsurface pollution.* In the absence of definite knowledge as to the subsoil or ground water from which the supply is drawn, a wide margin of safety should be allowed. The physical and hydraulic conditions surrounding the well which will either preclude the drainage reaching the well or will cause its purification are often somewhat complex in nature and difficult to determine by inspection only; a chemical and a bacteriological analysis of the water are frequently required to confirm an opinion. As a rule, however, the solution of the matter is simple. One can nearly always determine the general direction of ground water flow from the slope of the ground since it almost always flows in the direction of the surface slope,— at least so far as the flow near the surface is concerned. So that in most cases of wells and springs we may safely conclude that if there are no sources of pollution such as privies, cesspools, barnyards, etc., on the territory above the well in the direction of the slope of the ground toward it, there will be comparatively little chance of pollution of the underground water reaching the well. Any sources of pollution on the lower side of, or at one side of and not close to the well, will, except in rare instances, not pollute the well.

It should be borne in mind, however, that while sources of water that are located uphill from possible sources of pollution are in general safer than those which are lower down, this is not invariably the case, for the ground water level may at times slope in the opposite direction. Again, crevices and underground streams may exist in rocky, hard or clayey soils and convey pollution from relatively distant points. In such cases it is usually necessary to supplment observations with a laboratory analysis,

in order to determine the extent of any pollution or purification. Depth is also to be considered. Deep driven wells are less subject to pollution than shallow wells. In general it may be said that possible sources of pollution within 100 feet or so should be regarded with more or less suspicion. Privies within this distance should be of the sanitary type, that is, they should have water-tight pits or receptacles which are regularly cleaned out and the contents removed to a safe place.

Surface contamination should then be looked for. Many wells are perfectly safe as far as the underground sources are concerned and yet are very unsafe owing to the contamination through surface drainage in time of rain which may enter the top of the well through loose walls or by leaky covers. Indeed, the most frequent source of contamination of wells improperly constructed at the surface probably comes from the dirty condition of the ground around the well, from shoes of persons standing upon leaky covers and from washing of the hands in drawing water, etc., all of which tend to pollute the water in the well.

Protective construction of wells. There are many means of protection of wells against their surface sources of contamination; but the simplest and best in dug wells, is to have the well properly lined with brick or stone, which within a few feet of the top should be constructed of watertight masonry such as concrete, the well curb being carried a foot or more above the surface of the ground. The space around the walls should then be graded in such a manner that the ground surface will slope away in all directions from the well. If located on a hillside drainage ditches should be made above the well to deflect the surface drainage. The cover should be made water-tight by constructing it of concrete, or if wood is employed, a double covering of matched and leaded tongue and groove boards should be used. An additional precaution is to carry all waste water from the pump in a trough to a point outside and, if possible, on the lower side of the well so that the water will not drain back towards the well. The pipe for the pump should be connected by means of water-tight joints. Open wells, like the old-fashioned bucket-wells, should never be used, as they are most liable to contamination.

While many cases may arise which call for a more extended

knowledge than the principles above outlined, which apply equally to springs as to wells, if the public health nurse will familiarize herself with these and will use common sense and judgment, she will be able in most cases to form a correct opinion as to the probable safety of private supplies, and be in a position not only to report her findings to the health officer, but to explain to the householders, should occasion arise, how to remedy simple conditions which are apparently unsafe.

Sanitary analysis of water. A complete sanitary analysis of water includes a *chemical analysis* to determine the nature of the water and amount of chemical impurities present and a *bacteriological examination* to estimate the number and determine the kind of bacteria. The chemical and bacteriological examination of water is the work of an expert and the interpretation of the results obtained requires experience and judgment. Standard methods for water analysis have been established, after careful consideration by a committee of the American Public Health Association, and these have been adopted by common consent for certain routine work as giving the most uniform results. Crude tests which may be made at home or in the office by the average physician or nurse have little or no value; but the nurse may be required to take a specimen of water for analysis. She should, therefore, be familiar with the methods of collecting samples of water for examination.

Chemical analysis. Taking specimens of water for analysis requires considerable knowledge and care in order to avoid contamination of the water; but it can be done by a nurse who is trained in surgical cleanliness. About two gallons of water are required for analysis. The containers must be of glass or glazed earthenware, and be as clean as possible inside. The stopper must be of ground glass. It is always best to secure a container from the laboratory. The New York State Department of Health furnishes a two-gallon glass bottle in a wooden shipping case for taking samples of water for chemical analysis. If the sample has been collected in a sterile container with bacteriological precautions the same sample may serve for the bacteriological examination. Usually, however, the bacteriological sample is collected separately in a special two-ounce bottle at the same time. Care should be taken to secure a sample which is thoroughly representative of the

water to be analyzed. If it is taken from a river or lake, the bottle must be submerged, not too near the bank, and allowed to fill without disturbing any sediment in the water. If it is from a pump or faucet, the water should be allowed to run for several minutes before filling the bottle. A blank form accompanies each container for recording the source of the water and a sanitary survey of its surroundings, without which the results of the analysis can not be properly interpreted. The filled container must be plainly marked and numbered for identification, corresponding with a mark on the survey blank. The filled container should be sent or taken to the laboratory as soon as possible after the sample is taken.

Laboratory report. Many different substances may be found in nearly every sample of water, but tests are usually made for those only which have a sanitary significance. The chemist takes special note of those substances which indicate sewage pollution of the water, such as the organic products of decomposition and oxidation. These substances may be derived from harmless vegetable matter or from the soil, but when they are from such sources they are usually in small amounts and have no sanitary importance. The amount of such substances which are naturally in the water must be considered, therefore, before deciding whether it is polluted or not. Their quantity is of greater significance than their mere presence.

Interpretation of a chemical analysis. This is often a difficult matter which the nurse should not be called upon to decide, but she should understand the elementary principles involved.

Color is usually an indication of the quantity of vegetable matter dissolved in the water and is generally present only in surface waters. Ground waters are usually colorless. If water contains iron it will be perfectly clear at first, but will soon turn a rusty yellow. Color in water should be distinguished from turbidity. True color is due to dissolved impurities, decaying vegetable matter, etc.; turbidity is due to substances held in suspension.

Turbidity practically means muddiness; it is an indication of the presence of insoluble matter in the water and is often, though incorrectly, spoken of as color. Pure water is clear and sparkling, but clearness and brilliancy alone do not mean purity, while tur-

bid waters are not necessarily dangerous to health. All river and lake waters are more or less turbid, especially after a rain; but ground waters should never be turbid, and if so, should at once excite suspicion.

Odor and taste. Chemically pure water is absolutely devoid of odor and taste but it is also insipid for a water to be palatable must contain dissolved oxygen. Odors in water are objectionable rather than detrimental to health. As a rule, the most objectionable odors develop in surface waters and are caused by the growth of algae, protozoa and other microscopic organisms. The earthy odor of some ground water is due to substances dissolved during its passage through the soil. Taste is imparted to most waters by the mineral matter or gases held in solution. Heating a water often brings out an odor or taste not evident in a cold sample.

The total solids, or residue left on evaporation of a given quantity of water to dryness, indicate the amount of foreign matter that is either dissolved or held in suspension in the water. This residue includes both organic and inorganic substances. Loss on ignition indicates the organic matter which may be burned off, leaving the mineral residue which exists as such.

Hardness is a quality of water which has more of an economic than sanitary importance, indicating the capacity of water to dissolve soap.

Chlorine as sodium chloride or common salt is a normal constituent of all waters. An excess shows usually the presence of sewage or the excretions of animals. A comparison of the chlorine content of a water with that of other waters in the general vicinity known to be unpolluted frequently affords useful information as to its sanitary quality.

Ammonia, nitrites and nitrates. These are of considerable significance in a water analysis. Vegetable matter contains some protein and its decomposition may cause a small amount of nitrogenous substances to appear in a water. A large amount of protein of animal origin is contained in sewage and drainage from dwellings and barnyards. The organic matter in water consists largely of protein which is usually in the

early stages of decomposition. Ammonia is produced later in the process of decomposition, while nitrites are produced by the oxidation of the ammonia, the nitrates being among the final products of the process of decomposition of protein matter. Free ammonia as ordinarily found in drinking water is in itself harmless; its significance lies in the fact that it indicates the presence of putrefying organic matter. Its presence in clear, properly stored rain water has much less significance than in surface or ground water. Albuminoid ammonia is a fairly correct index of the amount of organic pollution in water. Nitrites in water are regarded as a special danger signal. The reason for this is that nitrites indicate that active putrefaction of nitrogenous organic matter is going on as the result of bacterial activity. They are never present except in small amounts, for they are oxidized to the higher and more stable nitrates. The absence of nitrites, however, does not mean that water is necessarily safe, for they may be absent in impure water, owing to the fact that the oxidation of the nitrogenous matter has not reached this stage or perhaps has passed it. The presence of nitrites in spring and deep well water may be without significance however, for in some cases they may be generated by the reduction of nitrates which are found in all water. Nitrates are the end products of the mineralization of organic matter present in all water. They indicate past or distant pollution. While the absence of nitrates does not necessarily mean purity, neither does their presence necessarily indicate immediate danger, unless found in excessive amounts.

Bacteriological examination. Practically all natural waters contain bacteria, the number and kind of the bacteria varying greatly in different places and under different conditions. The bacteria are washed into the water from the air, from the soil, etc. The intestinal contents of animals pollute waters with enormous numbers of bacteria, but it is the infection with certain species from man that makes water most dangerous.

A bacteriological examination of water is made in order to detect the probability of the presence of living bacteria of disease. The number of bacteria is not so important as their kind, but much may be learned from a simple enumeration of the bacteria; roughly speaking, the number of bacteria in water corresponds to the

amount of organic pollution. The characteristic bacteria which indicate pollution are the colon bacilli or those derived from the intestines. Their presence in water shows pollution with sewage or the drainage from dwellings and barnyards. Colon bacilli from man can not be distinguished from those of the lower animals.

Collection of samples. A two-ounce sample of water is sufficient for a bacteriological examination of water. The container must be a clean glass bottle which has been sterilized and provided with a ground glass stopper. The proper containers in shipping cases are supplied by the laboratory. A sample is taken with precautions to obtain an average specimen as in taking samples for chemical examination (page 59). The stopper is removed immediately before collecting the sample. The bottle is filled nearly full either by immersing it in the water or by allowing the water to flow into it. The stopper is then replaced tightly and the bottle enclosed in the shipping case, ice packed around it, and it is shipped or taken to the laboratory at once. It is important to keep the sample cold during transportation to prevent the multiplication of bacteria. Every sample of water for bacteriological examination must be accompanied by data regarding the sanitary inspection of its source, as in the case of a chemical sample. Specimens for both chemical and bacteriological analysis of water are usually taken from the same source and at the same time.

Bacteriological report. A bacteriological report of an examination of water is usually very brief, containing two items only: (1) the total number of bacteria per cubic centimeter; and (2) the presence or absence of colon bacilli. The number of bacteria reported is the number of the colonies that develop when 1 c.c. of a specimen of water is mixed with a suitable culture medium and kept at a constant temperature for two days. Two specimens are usually tested, one at a temperature of 68° F. and the other at 98° F. The ordinary bacteria of fermentation and decay grow best at a room temperature of 68°. The bacteria which grow naturally in the human intestines develop best at a temperature of 98° F. The report usually states the number of bacteria which develop at each temperature. When a test is made for the presence of colon bacilli three specimens are usually taken, one containing

10 c. c. of water, a second 1 c. c. and a third 1-10 c. c. Each is mixed with a culture medium favorable to the growth of the colon bacilli and which restrains the growth of other bacteria. The report states the presence or absence of colon bacilli in each specimen.

The significance of colon bacilli in water is that if they are present disease germs may also be present. In interpreting the significance of colon bacilli in water it is important to know the source of the water determined by a sanitary survey of the watershed, as the bacilli may be derived from a comparatively harmless source such as the droppings of wild and domestic animals. The absence of colon bacilli in water is presumptive evidence that the water is safe so far as bacteriology can prove it.

Prevention of Impurities in a Water Supply

There are three broad measures for the prevention of impurities in a water supply: (1) the proper disposal of all sewage and excrement, including the drainage from dwellings and barnyards; (2) the locating of the water supply at a point removed from a source of pollution; and (3) purification of the water. Cities are often compelled to go long distances in order to obtain an unpolluted water supply. If a river or lake is used both as a sewage disposal place and as a source of water supply the question arises as to which is the cheaper and safer process, to make other provision for the disposal of sewage or to purify the polluted water to render it fit for use. The solution of this problem must be studied for each individual city.

Purification of water. The measures most commonly adopted for the purification of water are: (1) sterilization; (2) filtration.

Sterilization by boiling is the most effective way to make impure water safe for household use. The boiling temperature will kill the bacteria of disease which may be present in water. The chief objection to boiling water is that it makes it taste flat and insipid by driving off the dissolved oxygen. The taste of boiled or distilled water, however, may be restored by aeration, that is, by shaking it in a partly filled bottle in order to bring it in contact with the air.

Chlorination is the process of sterilizing water by the addition

of chlorine either in the form of chlorine gas or as chloride of lime (bleaching powder). From .25 to .50 parts by weight of chlorine per million of water are usually sufficient to kill disease germs in a few minutes. In the case of grossly polluted waters as much as 2.0 parts or more per million may be required. Properly proportioned, the chlorine imparts little or no taste to the water. The process is adapted for sterilizing the water supply of a city or a small quantity of drinking water. The United States army uses tablets of chloride of lime to sterilize a few quarts or gallons of water at a time. The New York State Department of Health maintains a portable chlorinating outfit for emergency use in sterilizing public water supplies that suddenly have become contaminated. Other methods of sterilization such as ultra violet rays and ozone treatment are rarely used.

Filtration is often used for the purification of water supplies on a large scale. A filter unit usually contains from three to five feet of fine sand underlaid with coarse gravel and a system of underdrains. The water is applied at the surface and drawn off at the bottom, the impurities being removed by the sand. These filtration plants are either of the so-called slow or the rapid filtration type. In the slow filtration type the water is not chemically treated before it enters the bed, and the rate of filtration is slow, usually from two or three million gallons per acre per day. Clean sand alone has very little filtering action, for the bacteria pass readily through it. The efficiency of slow sand filtration, therefore, depends largely upon a natural jellylike growth of bacteria which takes place upon the grains of sand in the upper few inches of the bed. This growth usually takes a few weeks to form. When the surface of the sand has become clogged with impurities the bed must be cleaned, about one-half inch of sand with its impurities being removed and the filter bed then returned to use. A slow sand filter working properly will remove 99 per cent or more of the bacteria from water. In a rapid sand filter, the water is first treated with alum or other coagulating chemicals which form a coagulent which takes the place of the jelly-like growth in the slow filter. This insures efficient filtration when the rate of flow through the sand bed is forty to fifty times the rate of the flow in a slow filter. A rapid sand filter

usually must be cleaned every day in order to remove the accumulated impurities and flocculent matter between the grains of sand. This cleaning is done by forcing water up through the filter from below in a reverse direction, during which time the sand is agitated and the impurities washed out. While either type of filter, when it is worked properly, is efficient, it is customary to insure sterilization of the water by subsequent chlorination.

Household filtration. Most small filters attached to kitchen faucets are of little or no use. They may even do harm by introducing more bacteria than were in the original water. The only household filters that have a sanitary value are those made of unglazed porcelain similar to the filters used in bacteriological laboratories. They are efficient in removing bacteria, but the water passes through very slowly, and they must be frequently and thoroughly cleaned or sterilized or they may become unsafe to use from the accumulation of dirt and bacteria.

CHAPTER V

Disposal of Sewage

From a practical viewpoint the subject of sewage disposal may best be treated by considering the subject under two headings, the disposal of sewage of the individual home, and the disposal of sewage of the institution or municipality. Although the strictly scientific principles governing the methods of disposal under both these headings are the same, practical considerations such as simplicity, cost and maintenance make it desirable to treat each class separately.

DISPOSAL OF SEWAGE OF THE INDIVIDUAL HOME

The disposal of human excreta and sewage at the individual home in a manner that is safe and at the same time convenient and simple has always presented some difficulties. This is due to the fact that success depends not alone upon the selection of proper methods and upon good construction, but equally, if not more so, upon proper care and maintenance.

In dealing with this subject the first question that should be considered is as to what constitutes a sanitary method of disposal of excreta. Without entering into any elaborate discussion, this question may be answered by the following requirements:

1 It should not give rise to a nuisance, i. e., should not offend the senses in any way.

2 It should not be a menace to health, i. e., should not be a means of transmission to human beings of any disease germs which may be present in the excreta.

3 It should be convenient to the house.

4 It should be free from esthetic objections in regard to its location, condition during use, or manner and means of maintenance.

5 Its operation should not be affected by freezing weather.

There may be considered in general two distinct methods of disposal of sewage, the dry system and the water carriage system.

The dry system does not require a water supply, and as typified by the ordinary privy, either of the dug type or the removable receptacle type, is generally applicable for use at the country home where the number in the family is small and where economy is a consideration. The other, the water carriage system, serving the bath, toilet, wash basin, sink, etc., requires an ample supply of running water in the house delivered under pressure and is applicable only where soil conditions, topography, area of land, etc., are favorable. There is what might be considered a third type, a sort of compromise between the two systems which, however, more nearly approaches the dry system and for this reason will be considered with and as a modification of it.

The dry method of disposal is essentially exemplified by some form of privy, of which there are in general three types; the underground vault or common dug type; the removable receptacle type, and a combination of the former with a subsurface irrigation system, the liquid portion from the vault passing into a system of agricultural tile pipe laid a foot or more beneath the surface of the ground.

For a family of from five to ten persons where a simple and inexpensive method of disposal is desired, a properly dug excavation properly shored with plank to prevent caving in, with a privy building over it properly screened, will ordinarily be found to be a sufficiently sanitary means of disposing of human excreta to meet most local conditions and requirements in the country. It presupposes that the water supply of the home, if a well or spring, is located on ground above the privy or at least not along the same line of drainage so that pollution can be carried to it.

Such a type of privy is shown in Fig. 1. The excavation should be about 4 feet wide by 5 feet long, or possibly 5 feet square, and from 5 feet to 6 feet deep. The sides should be carefully shored with planks and braced to prevent caving in. The earth surrounding the top of the excavation should be sloped away on all sides, or a small trench should be dug around it to deflect any surface water during rains. The floor and sides of the privy building should be tightly boarded, particularly around the base, to exclude flies. The doors and windows should be screened in summer time and the seat openings should be provided with hinged covers. A ventilator may be run from the vault inside the build-

ing through the roof with screen top, if desired. An endeavor should be made to keep the vault beneath the seats entirely closed, except for the screened ventilator, to exclude flies and to prevent too much circulation of air which would intensify putrefaction and odors. The interior of the privy building should, on the contrary, be freely ventilated through screened openings, since this will minimize odors. The frequent sprinkling of fine, dry earth, and the occasional sprinkling of chloride of lime over the contents of the vault will also tend materially to reduce odors. If these simple provisions are strictly carried out, odors will be reduced to a minimum. The contents of such a privy vault should not be allowed to fill higher than 18 inches below the top. Before this level is reached the contents should be removed in water tight containers and disposed of by burial in trenches at a depth of not less than one foot beneath the surface of the ground at some isolated point at least 200 feet from any building; or a new pit should be dug and the privy building removed to it. In the latter case the old pit should be filled to the surface of the ground with clean earth and properly protected with planks and the excavation kept full until the contents of the pit have become thoroughly consolidated.

The next type of privy is the one provided with removable receptacles. This type, shown in Figure 2, is entirely above ground and the building is arranged so that the seat forms part of the closed compartment which contains the receptacles. The inside of the privy building is otherwise arranged similarly to that over the dug vault type above described. Beneath the openings in the seats are placed receptacles for receiving and storing the excreta. The receptacle should be a durable metal can, preferably a heavy galvanized metal ash can with a handle on each side. A very convenient size is known as a No. 3 ash can, 15 inches in diameter and 26 inches high. A privy provided with two such cans would be appropriate for a family of six persons and would ordinarily require cleaning not oftener than once a month. The cans are removed through a hinged door in the back of the building. The contents should be buried in an excavation at some remote and safe point and be covered with at least 18 inches of earth.

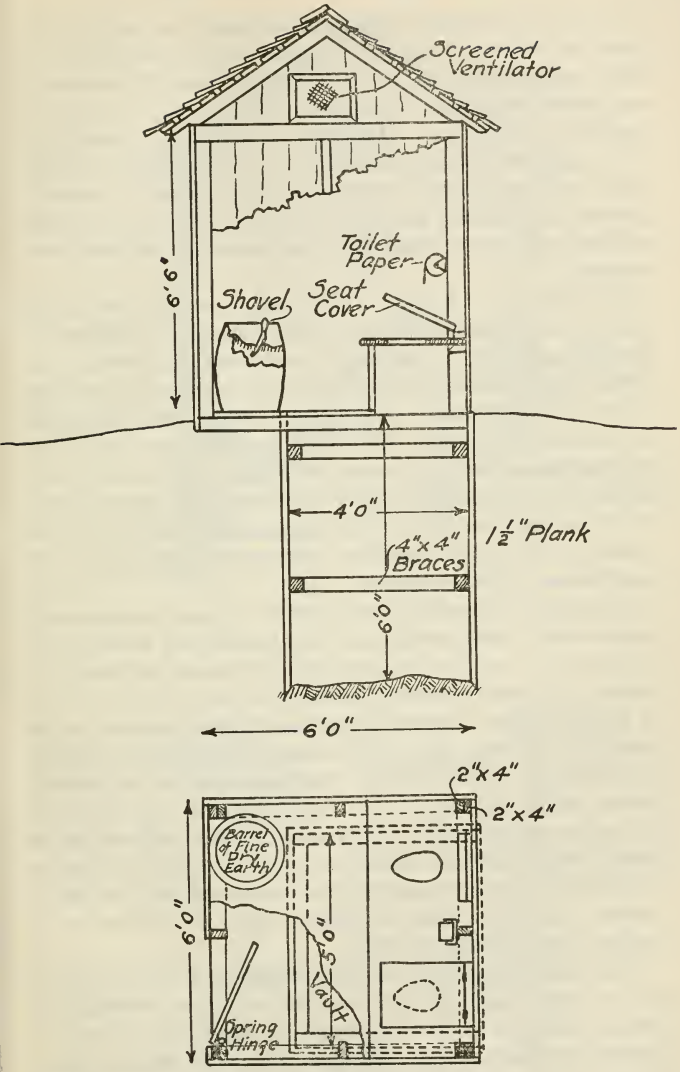


FIG. 1
PRIVY WITH VAULT

In one corner of the privy should be placed a barrel filled with fresh dry earth or loam and provided with a small shovel. A small amount of this earth should be thrown upon the contents of cans after each use. Occasionally chloride of lime may be sprinkled into the cans. Also from time to time a handful of borax may be sprinkled into the cans to suppress fly breeding should any flies succeed in getting into the building. In order to prevent the cans from becoming too full the seat covers should be provided with locks in order that either cover may be locked when necessary.

This latter type of privy is considered by some to be the most sanitary, for it has a maximum of advantages and a minimum of disadvantages. It is particularly applicable for summer conditions where freezing is not a factor, and is generally applicable for the farm since there is no pollution of the soil and consequently no contamination of the well. It is perfectly permissible, provided all precautions are observed, to locate a privy of this kind at the back of the woodshed or other convenient place near the house where one may reach it under shelter. Caution, however, in not locating it too close to a kitchen, and most scrupulous care in its maintenance, must be observed.

The question of possible freezing of the contents is one that will require careful consideration and it is possible that at most country places the outside of the privy may be protected sufficiently in winter to obviate freezing by a loose covering of leaves or straw or in other ways. Another suggestion in this connection is the possibility of having extra cans on hand to replace any cans that may have their contents frozen. The full cans can be conveniently stored outside at some safe and remote place without danger in the winter time and until a thaw comes, at which time advantage should be taken of the weather to empty the cans. It must be remembered in this connection that trenches should be dug in advance ready to receive the contents when the cans are to be emptied during the winter time.

It is believed that these two types of privies, the dug privy and the removable container type, are the only types essential for proper sanitation in rural districts; the dug privy affording a convenient and economical type where there is no danger of pollution of a water supply; the removable receptacle type affording

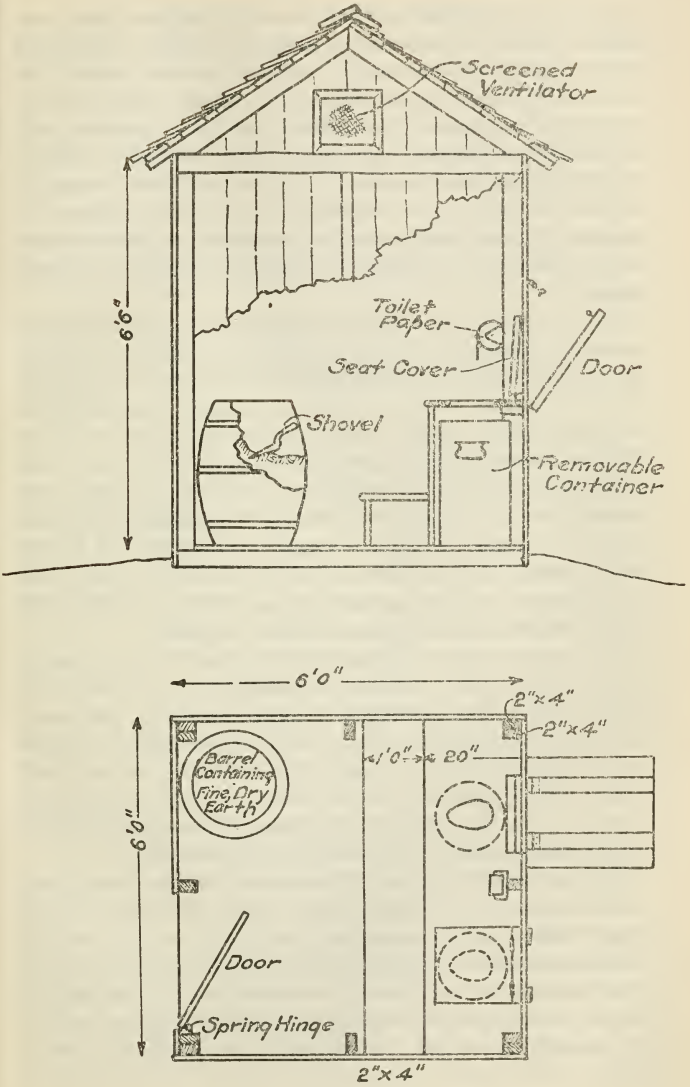


FIG. 2
PRIVY HAVING REMOVABLE CONTAINER

one which is applicable to places where soil pollution is not permissible. With the requirement of proper location fulfilled and the possibility of water supply pollution avoided, there is no reason to doubt the sanitary propriety of either. Indeed there is very much to commend the ordinary dug privy, properly constructed and maintained, where this type is permissible, since it is essentially the most economical type for the farmer to employ and since it obviates the troublesome and potentially dangerous feature of maintaining removable receptacles, especially where such maintenance is delegated to possibly ignorant or careless persons.

For the country home, whether the farm, the isolated cottage, or even the house in a sparsely settled hamlet where the grounds are comparatively large and houses well separated, the two types of privy shown by Figures 1 and 2 if properly constructed and maintained afford means for disposal of human excreta which fulfill all necessary requirements of sanitation with a minimum of cost and maximum of simplicity. Other types such as the watertight vault involving either the use of implements for cleaning or the disposal of liquid contents into the soil are, for the country home, either unnecessarily costly, are more objectionable if not offensive in use or in maintenance with the facilities ordinarily available, and are a greater menace to health.

At the present time there seems to be a general and increasing demand in the country districts for a supply of running water in the home and for the installation of inside plumbing. The inconvenience of pumping water from a well and of using the outside privy on the one hand, and the greater simplicity and ease with which running water may now be introduced under pressure into the home on the other hand, have encouraged the well-to-do farmer and the cottage owner to insist on these improvements.

There are very few people in the country, however, who have a clear conception of the responsibilities which the water carriage system involves, and it seems rather the exception than the rule to find one who does not think it permissible to run the drain pipe from his toilet and bath directly into some stream, used perhaps by others below for a water supply; and eminently proper to do so if a so-called "septic tank" is installed somewhere along the sewer line.

A number of important conditions should therefore be impressed upon those who would install these conveniences in the country home. First, the liquid wastes or sewage from an ordinary household are from 100 to 300 times as large in amount as the concentrated human excreta to be disposed of by the dry method. Secondly, sewage is just as dangerous in character, so far as affecting health, as are the concentrated excreta, and in some respects even more so on account of the ease with which the large quantity of liquid may become disseminated or scattered through the soil or on the ground or into a stream. Thirdly, there are serious limitations as to the conditions of soil and topography under which the installation of a water carriage system is practicable, or at least economically so, for where the soil is composed largely of clay or rock this method if practicable at all is very expensive.

The amount of sewage to be disposed of from a family of five or six persons in a country home provided with toilet, bath, wash basin and sink, will ordinarily not exceed 300 gallons per day, and the method best adapted to dispose of this in a sanitary manner will depend upon the character of the soil, and the topography and availability of sites with reference to protection of the water supply. The sewer line leading from the house should be of cast iron or glazed tile of hub and spigot pattern, and should be laid upon as uniform a slope as possible, with a fall of at least one-eighth inch or preferably one-quarter inch to the foot, and at a depth of not less than two feet beneath the surface. The disposal plant should be located on land which is lower than the well or other source of water supply or at least not on the line of drainage toward it, and preferably on land which is gently sloping and not subject to saturation or flooding.

The method of disposal to be selected will depend largely upon the character of the soil, although somewhat upon topography, especially if the subsurface irrigation method is employed. If the soil is of sand, or is light and porous in texture, the ordinary leaching cesspool, such as is shown by Figures 3 and 4, will generally answer all requirements. A cesspool suitable for a family of five or six persons may be simply and economically constructed as shown in Figure 3, of loose broken field stone, open on the bottom and provided with a flat stone slab or heavy oak cover, the

whole covered over with earth or sod. The top covering may extend slightly above the natural ground surface with ground sloping away in all directions, and the upper few inches may be cemented in order to deflect and prevent the entrance of surface water during rains. A vent pipe extending above the ground terminating in a cowl or bend should be inserted at or near the cesspool in order to prevent back pressure of air on the plumbing system. A more durable covering would be an iron manhole frame with perforated cover such as is used in a street sewer.

An improved type of leaching cesspool may be constructed of hollow building brick as shown by Figure 4. The bricks are laid with cement joints, the hollow portions extending radially from the center of the cesspool, thus giving opportunity for free radial percolation into the surrounding soil. If the soil is firm a foundation is unnecessary, otherwise a footing course is provided.

Where the soil contains a large percentage of clay or is otherwise somewhat impervious, and the leaching cesspool alone is insufficient to afford the necessary percolating area to prevent rapid filling and overflowing, relief may frequently be had by providing additional area for percolation. This is conveniently accomplished by extending a few short lines of open jointed sewer pipe or agricultural tile from a point near the top of the cesspool out into the surrounding soil. These few lines of pipe may be considered the simplest form of what is known as the "subsurface irrigation system," a system which may be elaborated or extended to accommodate as many as 100 persons, although experience in this State indicates that it is rarely practicable to extend it to serve many more than this number.

In the construction of a subsurface irrigation system, careful attention must be given to details. The essential parts of this system are the settling tank, the dosing tank, where this is employed, and the irrigation field. The simplest form is that shown by Figure 4 comprising the ordinary cesspool and a few lines of tile radiating from a single overflow pipe, the latter being usually submerged or trapped in the cesspool by the use of a quarter bend, or "T," designed to prevent floating matter from entering the overflow pipe. In a more elaborate system a concrete settling or septic tank will be necessary. This tank is usually of rectangular shape and the larger ones are preferably divided into

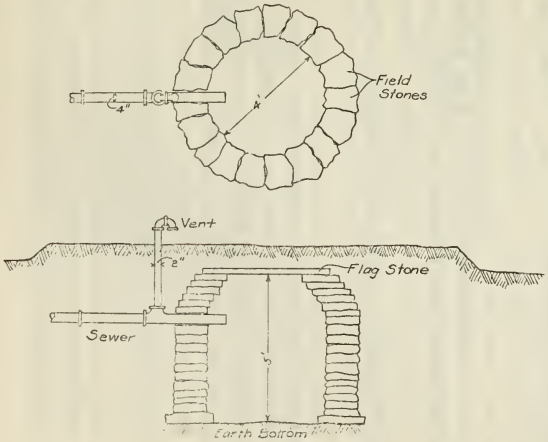


FIG. 3
LEACHING CESSPOOL CONSTRUCTED OF FIELD STONES

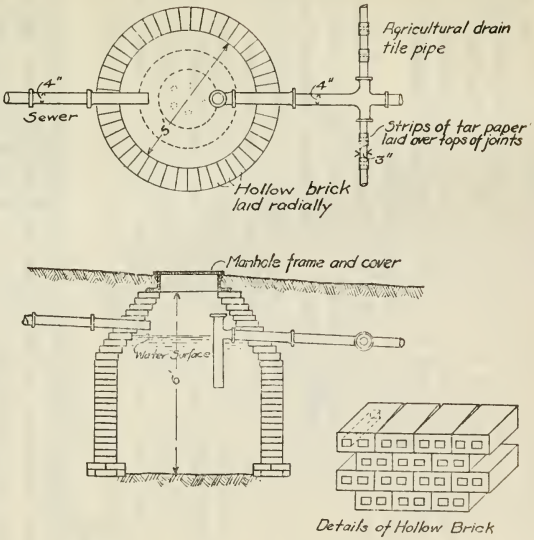


FIG. 4
HOLLOW BRICK CESSPOOL WITH OVERFLOW INTO AGRICULTURAL TILE

two compartments by a partition wall for convenience of cleaning. A tank 4 feet wide, 4 feet deep and 6 feet long, would have ample capacity for a family of 6 or 8 persons. For additional numbers of persons the dimensions should be increased proportionately. A dosing tank provided with an automatic siphon is frequently provided also, though this is not absolutely necessary.

Where the dosing tank is used it is customary to combine it with the settling tank by means of a division wall as shown in Figure 5. The automatic syphon is a commercial product, variable in type, and is obtainable from a number of manufacturing concerns dealing in sewerage and sewage disposal devices. The size to be selected will depend on the number of persons contributing sewage, but ordinarily a 2-inch or 3-inch siphon will be sufficient. The siphon discharges the contents of the dosing tank intermittently into the irrigation system whence it is distributed by percolation into the soil beneath, where it becomes purified by filtration.

The irrigation system itself, especially one of the more extensive ones, comprises a series of lines of 3-inch or 4-inch agricultural tile pipe branching from one or more main distributing lines of larger diameter as shown in Figure 5. These lines of pipe are usually laid from 12 inches to 15 inches beneath the ground surface and not closer than 4 feet apart. All pipes are laid with open joints, i. e., with the ends barely touching and with the upper half of the circumference covered with a collar or strip of tar paper to prevent silting in of the earth above. These lines of pipe are ordinarily laid on a very slight slope, not more than 6 inches in 100 feet, and it is therefore desirable that a level or gently sloping field be selected. To secure these slight gradients the different pipe lines are laid approximately along contour lines (i. e., lines having the same elevation, as illustrated). The length of pipe necessary for any system will depend upon the character of the soil and the number of persons served. No definite rule can be laid down, but generally speaking, in sandy soil, 10 to 20 feet per person will usually suffice; in light, loamy soil, 40 to 60 feet; in clayey soil this system is not applicable at all and recourse must then be had to some such system as artificial sand filtration.

The most essential precaution to be observed in constructing the irrigation system, neglect of which has been the cause of most

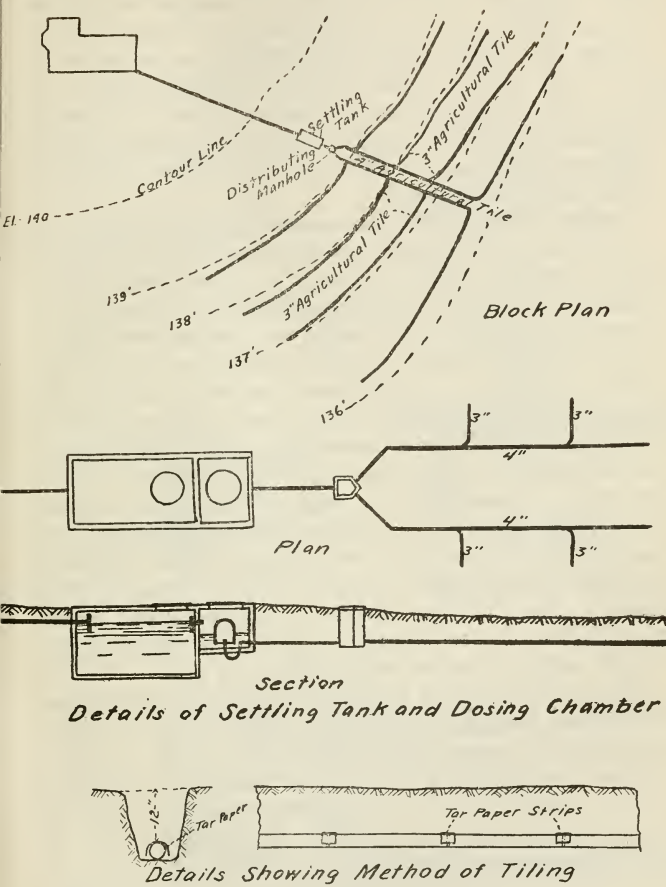


FIG. 5

SHOWING ARRANGEMENT AND DETAILS OF SUBSURFACE IRRIGATION SYSTEM — GENTLE SLOPING GROUND

failures, is to have the open joints properly protected. These joints are designed to permit the outflow of sewage effluent into the soil, but if they are not properly protected they may permit the adjacent soil to wash or sift in through them and cause obstructions, if not fill up the pipe. It is very necessary, therefore, to have the top of each joint covered as shown in detail in Figure 5, preferably with a strip of heavy tar paper about 4 inches wide and extending over the top and well down on the sides of each joint, but not entirely encircling it.

Another important detail in connection with this system is the arrangement of the different lines of pipe where the slope of the land is somewhat steep. One system is to have a main distributing line run down the steep slope and the branch lines lead from it along level contour lines. Another and perhaps better plan is to omit the main distributing pipe altogether and lay out the entire system in one or two continuous lines with a series of short steep and long gentle slopes. The line would first run down the steep slope to the next lower contour then turn and run along this contour line with a gentle slope to the opposite end of the field; then turn a right angle and run down the steep slope to the next lower contour and so on. A third and perhaps the best plan is to have the different lines of tile each provided with its independent distributor, each distributor leading from a common diverting manhole. Each line thus receives its independent and proportional share of the dose, and there is thus a uniform distribution over the entire field without surcharging at any point.

There are a number of methods of sewage disposal other than the ordinary cesspool and subsurface irrigation system, such as sand filtration, contact beds and sprinkling filters; but while applicable to large sewerage systems for villages and cities, they meet the requirement of the country home for these methods all demand special knowledge and skill to construct, involve the final discharge of an effluent into some watercourse, and to be successful need not only more intelligent but more skilled supervision that is ordinarily available at the country home. The ordinary cesspool or a series of leaching cesspools installed with the precaution above pointed out will usually meet all requirements demanded in the contry; and where the cesspool is sufficient there will be few cases indeed where the subsurface irrigation

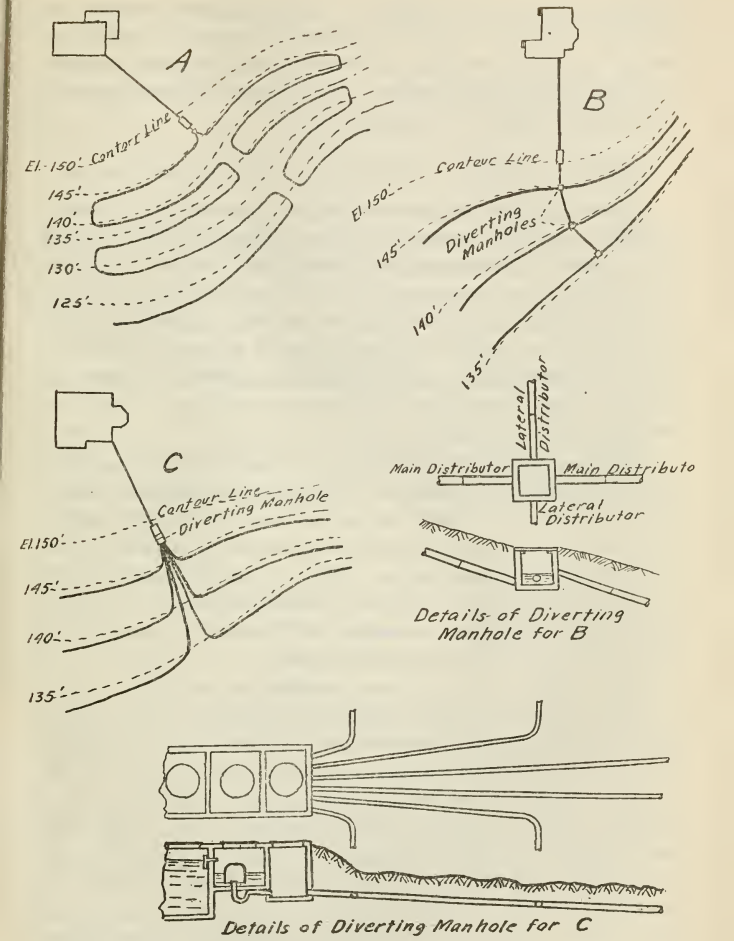


FIG. 6

SHOWING ARRANGEMENTS AND DETAILS OF SUBSURFACE IRRIGATION SYSTEM — STEEP SLOPING GROUND

system will not prove adequate. Neither of these methods involves an effluent to be finally disposed of into some watercourse, and both are more sanitary, self-maintaining, and, when properly installed, require less attention than the more elaborate methods applicable to village and city conditions.

DISPOSAL OF SEWAGE OF INSTITUTION AND MUNICIPALITIES

In considering the disposal of sewage of institutions and municipalities it will be assumed that the sewage has been collected in a system of intercepting and outfall sewers which conduct it to a suitable point for sewage disposal. In order to understand the methods by which such sewage can be properly disposed of it will be well first to consider the composition of the sewage which in American communities usually contains from 400 to 500 parts per million of solid ingredients, this being equivalent to about one-twentieth of one per cent.

Of these solids, about two-thirds are found to be in suspension and about one-third in solution. Again, of the suspended solids about two-thirds are organic matter and one-third mineral matter; while of the dissolved solids about one-third is organic matter and two-thirds mineral matter. It is in fact this small amount of organic matter, less than five one-hundredths of 1 per cent, which gives to this class of sewage its objectionable qualities and renders it at times difficult of purification.

When sewage of this character is discharged upon land, or into a body of water, it becomes objectionable, usually in one of three ways. It may, in the first place, become objectionable in appearance, due to the floating or fine suspended matters present in the sewage. These matters tend to form unsightly deposits upon the bed and banks of a stream, and to interfere in many ways with the industrial or pleasure purposes for which a stream may be used. This objectionable feature, while affecting mainly the esthetic quality for a stream, and only those persons or industries that actually use the water, does not in itself affect public health.

In the second place sewage may become offensive as a result of a diffusion of gases resulting when decomposition is carried to the point of putrefaction. Although this feature affects the comfort of those living along or in the vicinity of a stream, the

most careful investigation fails to reveal that it has any serious effect in producing specific diseases.

Finally, sewage may become objectionable through the dangerous ingredients contained in it, which affect the health of human beings. These are the pathogenic or disease-producing bacteria frequently present in the sewage. They enter it from a variety of sources such, for instance, as from human discharges.

Generally speaking, any method of sewage disposal for an institution or small community must have for its object the fulfillment of one or all of the following requirements, viz., to remove the coarse and fine suspended matter, to prevent offensiveness to the body of water or land into or upon which the sewage is discharged, and to render harmless the disease germs contained in the sewage. The extent to which these requirements must be fulfilled in any case will depend upon the volume, the character and the uses made of the stream into which the sewage is to be discharged. Although there are no set rules that can be strictly adhered to, the following generalizations are made with respect to such requirements:

First, where a stream is not subsequently used for a public water supply, but where its esthetic or industrial qualities are important, and where the volume of flow is so large, as compared with the volume of sewage, that offensiveness will not result, it will be only necessary to remove the suspended or floating matters by efficient screening or settlement.

Secondly, where a stream is not used subsequently for a public water supply, but where the volume of sewage discharged into it compared with the volume of flow is so large that offensive odors may arise, it will be necessary, in addition to the removal of suspended matters, to remove or oxidize the organic matter in the sewage. This can only be done by means of sewage purification and the effluents under these conditions must be what is termed stable, *i. e.,* purified to such a degree that it will not of itself, or when discharged into the stream, subsequently putrefy.

Finally, where a stream is to be subsequently used for a water supply not adequately protected by water purification it may be necessary to remove all substances from the sewage, including the bacteria.

Where a community is favorably situated with reference to a large body of flowing water the method of dilution becomes a satisfactory one. If, however, it is not so favorably situated or if the sewage must enter a stream or river which is subsequently used as a source of water supply, or if it is discharged into tidal waters in proximity to oyster beds this method must be abandoned in favor of some method of artificial purification.

Of these artificial methods perhaps none is more effective than that of filtration, or the slow percolation of the sewage through beds of porous soil or sand. This method has been used for more than a century. It is in fact nature's method of purifying dirty water, which after rains flows over the surface of the ground, descends slowly through the pores of the earth, and finally issues as pure spring water.

This method of filtration has been very thoroughly studied for many years in this country and abroad and it is now possible to foretell within narrow limits how much sewage of a certain composition can be successfully purified when the quality and the size of the sand grains are known. Generally speaking, an acre of good effective sand can be so arranged as to purify indefinitely the sewage of about 1,000 persons. If the sand is coarse and deep, or the sewage has received some preliminary treatment to remove the suspended matters, a still larger amount of sewage can be treated. If the sand is fine, or mixed with loam or clay, this amount must be correspondingly decreased, reaching almost nothing for soils composed mostly or wholly of clay.

It is usual to arrange sewage filters in beds or units of a definite size with the surface nearly level to insure a uniform distribution of the sewage. Beneath the surface at a depth of a few feet is laid a system of collecting pipes or underdrains. The sewage is applied in turn to each of the beds, and after percolating slowly through them is collected in the system of underdrains and discharged into the nearest watercourse.

When beds of porous material are not available or land is expensive it is frequently found more economical to purify sewage by some other method than sand filtration. Of these methods chemical precipitation has been satisfactorily practiced in the past, and although this process has given way to more economical and effective ways it is still used in many places.

By this method the sewage is passed through tanks after it has been treated with certain chemicals such as lime or salts of alumina and iron. The sewage may be passed slowly through the tanks at a uniform low velocity, or the tanks may be filled, allowed to stand for a period of time and then discharged. In either case the chemicals unite with certain constituents in the sewage and form a coagulum which settles to the bottom of the tanks, carrying with it and precipitating upon the bottom the suspended matters in the sewage. The relatively clear effluent is then passed off and discharged into the nearest watercourse or subjected to further treatment.

This method of disposal at the present time is not considered a complete one in itself, but is practiced as such in some places and is frequently employed as a preliminary treatment. The difficulty of disposing of the sludge, the high cost of chemicals and the low purification effected make this method, however, a comparatively expensive one, and its field of usefulness restricted to peculiar local conditions or to the disposal of certain classes of trade wastes.

Of greater utility than the chemical precipitation tank is the so-called septic tank. The origin of this appurtenance in sewage disposal is our well-known cesspool. In fact the septic tank may be considered nothing more than a large cesspool, scientifically constructed and operated, so that the highest biological efficiency is attained. If, then, through a long and narrow tank domestic sewage is allowed to pass, certain results are obtained depending upon the rate at which the sewage flows. When this rate is relatively high, *i. e.,* if the period of detention in the tanks is less than about four hours, a mere settling or sedimentation of the sewage results — a merely mechanical result with no appreciable biological action. When this rate of flow is lessened, however, and the detention period increased to about eight hours, entirely different results are secured. Instead of mere mechanical subsidence there is in addition a bacterial or septic action which produces marked changes in the organic matter.

The biological processes carried on in the septic tank are rather complicated. They are also quite variable in activity depending upon many factors such as the composition and age of the sewage, its temperature, the period of detention and the velocity of flow

through the tank. The process may be briefly described as one in which decomposition is allowed to continue until the sewage putrefies. The bacteria, working under anerobic conditions, are able to break down the more complex and unstable organic compounds and convert them into simpler and more stable ones. This conversion results in a liquefaction of portions of the suspended organic matters and a liberation of certain gases, such as sulphuretted hydrogen, marsh gas and ammonia. The portion of the suspended organic matters not liquefied either rises to the surface to form a scum over the liquid in the tank, or settles, together with the mineral suspended matter not previously removed by settling or screening to the bottom of the tank in the form of sludge. This sludge must be removed from time to time and disposed of by special treatment.

The septic tank thus fulfills a two-fold object, removal by subsidence of a considerable portion of the suspended organic and mineral matters and the decomposition and liquefaction of a large part of the suspended organic matter. The organic matter thus converted is in a condition which many believe to be better suited to subsequent oxidation and nitrification than is the case with the raw sewage. And whatever may be said against the economic value of the septic tank, there is little question but that properly septicized sewage is more easily treated than either raw sewage or sewage that has been subjected to plain or chemical precipitation, and that the septic tank will continue to be a useful preliminary device in sewage disposal for many years to come.

The treatment of either settled or septic sewage is usually accomplished by means of sand filtration, previously described, or by means of coarse grained or rapid filters. Of the latter class of filters there are two general types; the contact bed and the sprinkling filter. Although both are composed of the same materials — a mixture of coarse stone, gravel or coke — and are usually laid out in beds or units, their construction and operation are somewhat different.

The contact bed is usually constructed as a tank in which the filtering material of graded sizes is deposited with the coarser material at the bottom. The sewage is run onto the bed until it is full and is allowed to stand in contact with the filtering material

for a definite period of time. During this interval, and under the conditions of an ample supply of oxygen, the organic matter is rapidly acted upon by the aerobic bacteria until it is oxidized or nitrified, *i. e.,* subjected to the last chemical change or action in the process of decomposition. At the expiration of this time period, ranging usually from two to four hours, the purified liquid is drained from the bed and discharged into the nearest stream, or subjected to further treatment.

With the sprinkling filter the construction is almost identical with that of the contact bed, except that the walls surrounding the filter may be omitted. The sewage is, however, applied in a very different way. Instead of flooding the filtering material the sewage is distributed through nozzles over the beds in the form of sprayed and allowed to percolate through them to the underdrains beneath. In this way a better opportunity is afforded for aeration and nitrification, and results show that not only is the bacterial efficiency of the sprinkling filter higher than that of the contact bed, but that, owing to the better opportunities for oxidation, a larger volume of sewage can be purified per unit volume of filtering material.

The effluents from both contact and sprinkling filters, though stable in themselves, and generally of satisfactory quality to be discharged into any watercourse, are, however, not entirely free from suspended matters. Fine and sometimes rather coarse particles of the film or coating attached to the stones of the filters, which form harboring places for the bacteria while performing their work of nitrification, become dislodged and are carried into the effluent. These particles are mostly stable, inert matter, relatively coarse and heavy and subside quickly when the velocity of the effluent is checked. When it is desirable then to remove this suspended matter and to secure a clear effluent, it is only necessary to pass the effluent through a settling tank of moderate size and allow the suspended matter to settle out.

Again, we find that the effluents from these rapid filters are not entirely free from bacteria and in some cases they show a very incomplete removal. These bacteria are in a large measure carried into the effluent along with the other suspended matters just described, and are probably of the harmless variety of nitrifying

bacteria that have developed either in the septic tank or in the filter. It is also probable that many of them are of the pathogenic species originally present in the sewage, so that there may be cases where it is desirable or imperative to remove not only the suspended matter but also the bacteria. When this standard of purity is demanded it becomes necessary to resort to supplementary treatment either along lines practiced for the purification of water, such as mechanical or slow sand filtration, or by some method of sterilization.

The disinfection of a sewage effluent or of raw sewage is generally accomplished by the application of chloride of lime or chlorine gas. In either case after the disinfectant is applied the sewage or effluent is usually passed through a small detention tank holding from 10 to 20 minutes flow in order to afford opportunity and time for the chemical to act upon and kill the bacteria. If chloride of lime is used it is first made into a solution and the solution is applied to the sewage uniformly in proportion to the flow. If chlorine gas is used it is usually applied directly to the sewage or effluent through a diffuser from cylinders of chlorine which contain the gas in liquid form under pressure. In applying the gas it is generally passed through a regulating device which automatically permits of its application at uniform rates proportional to the flow of the sewage. Only small amounts are required for disinfection, ranging from 5 to 25 parts of free chlorine per million parts by weight of sewage or sewage effluent, the larger amounts being used for raw sewage and the smaller for sewage effluents.

CHAPTER VI

Control of Flies, Mosquitoes Other Insects and Vermin

It has been proved by scientific experiments that flies are active factors in the transmission of disease; that the female anopheles mosquito is an essential factor for the spread of malaria; that bubonic plague is a chronic disease in rats, the internal parasite of which is conveyed to humans through the bite of the flea; and that the body louse is the intermediary host in the transmission of typhus fever. The control of the fly, mosquito and rat through attack upon their breeding places and food supply, and measures for the complete destruction of the louse, have thus become an integral part of any comprehensive sanitary program which may fall within the province of the public health nurse.

The fly. Studies of typhoid fever in the United States Army camps in 1898, and later in the city of Jacksonville, and the study of diarrheal diseases of infants made in New York City in 1915, have clearly demonstrated that the presence of the fly with access to human excrement and other discharges or food supplies increases the prevalence of these diseases. The campaign for the control of the fly involves (a) prevention of fly breeding and (b) prevention of flies having access to human beings and to their food.

In the supervision of communicable disease, or in a sanitary survey looking to prevent conditions which are factors in causing disease, the nurse may be called upon to make a survey of all privies in the community, noting overflow, failure to screen or other insanitary conditions which permit access of flies to the excrement, and of places where are found manure or other refuse matter in which flies are wont to breed.

The practical methods of controlling the spread of disease by flies fall under four main headings:

(1) The prevention of the breeding of the fly by the elimination of its breeding places. This requires the proper care of stable manure and the removal or disinfection of all decomposing refuse such as garbage, wet papers and rubbish of all sorts. The treatment of manure and other refuse with chemical disinfectants for

the prevention of fly breeding is a new development of the last few years and progress has been rapid. Borax has proved much more satisfactory than the substances previously used, and now the United States Department of Agriculture recommends hellebore as even better than borax.

(2) The control of breeding places must usually be supplemented by the trapping of adult flies. A simple and effective trap may be made from a grocery box by substituting wire netting for the top and two sides, cutting a round hole in the bottom and inserting in it a wire cone with an eight inch opening at the bottom and a half-inch opening at the top. A suitable bait, a fish head for example, may be placed under the box and the flies which seek it will fly from it up toward the light and through the small top opening into the box. Dead flies may be shaken out through a small opening ordinarily closed by a sliding door.

(3) The measures suggested above will greatly reduce the number of flies but are not likely to do away with them entirely. As long as any flies at all are about it is essential to keep them from human excrement where they may pick up the germs of typhoid fever and similar diseases. Privy vaults should therefore be most carefully constructed to exclude flies. The discharges should be received in a tight receptacle and all openings for ventilation, etc., should be screened with wire or cloth mosquito netting and all cracks in the walls or openings under the bottom should be closed.

(4) Finally, the doors and windows of houses should be screened, especially in the kitchen and dining room, in the nursery and any room in which there is a case of sickness. Care should be taken to see that the screens fit accurately and that they are always in place and that screen doors are not left ajar or kept open. If wire screen can not be afforded flies may be kept out by cotton mosquito netting tacked over the windows. Flies that do get into the house should be killed or should be caught in a saucer of water containing formalin, sugar and water.

Fish and meat markets and restaurant kitchens should be equipped with fly traps. Ten thousand flies have been caught in three days at such places. If there are clouds of flies in the market or the dining rooms or if foods exposed for sale are unpro-

tected against flies, the wise customer will go elsewhere with his patronage.

The anopheles mosquito. The presence of the female anopheles mosquito is requisite for the spread of malaria. To determine if a given case is one of malaria it is necessary to submit a smear of the patient's blood for laboratory examination for the demonstration of the presence or absence of the malarial parasite.

The practical control of malaria consists in destruction of breeding places of the anopheles mosquito, the capture of the adult insect, thoroughly screening the sick person from a visit of the female anopheles mosquito and medical treatment of the malarial patient.

In order to determine if the larvae of the anopheles are present in a locality the nurse may be required to collect specimens of water from places where they might be expected to breed. For this work she should be provided with a canvas or other bag or satchel, a small dipper with long handle, a teaspoon, and several small vials with stoppers. The larvae are found in the sedges and other vegetation bordering ponds, puddles, ditches and streams, generally in clean, clear water, sometimes in streams with considerable current, rarely in cans and rain barrels unless some vegetation is present, rarely in sewage-polluted streams, but often in hollows in logs, footprints of animals in the fields, and even in cups and basins formed by large broad leaves and pitcher-shaped plants. The ova of the anopheles mosquito float on the surface of the water and are grouped in a pattern not unlike the meshes of a fish-net; the ova of the culex variety also float, but they are grouped together in the form of a little raft. The larva of the anopheles is much the most sensitive of the mosquito larvae, hiding when disturbed by sounds or even shadows, but coming to the surface for air. It may be distinguished from the larva of the culex in that it floats horizontally to and just under the surface of the water, while the culex larva suspends itself at an angle to the surface, tail up and head down, into the water. It requires from 9 to 16 days for the transformation from ovum to mosquito, and somewhat longer if the weather is cool. Some practice and much patience will be needed before the nurse will become skilled in collecting larvae.

For securing specimens and for capture of the adult mosquito several large test tubes with rubber bands soaked in chloroform in the bottom of the tube should be used; the mosquito is trapped in the tube, the chloroform quickly acts and a pledget of cotton secures her for examination. The anopheles mosquito may be identified while resting, by the fact that the body from head to tail is in a straight line and at an angle of about forty degrees to the surface on which it is resting. The culex mosquito has a bend or flexion at the thorax which causes the head to point toward the surface on which it is resting, the body being almost parallel thereto.

To destroy its breeding places, weeds, sedges and grass should be cut and cleared from all possible haunts of the mosquito. It may be found necessary to burn out the vegetation bordering the puddles and ditches. The ponds and streams should be stocked with small minnows which eat the larvae and the surface of the water should be oiled. For this latter purpose Chapin estimates the required amount to be an ounce of crude petroleum to 15 square feet of surface, the oiling to be repeated regularly every 7 to 14 days during the breeding season. A lamp wick or piece of waste loosely placed in a hole in a keg of oil will make a satisfactory applicator, which may be managed from a small boat. For puddles, ditches and trenches, it will be necessary to use a spray. Systematic search of houses for the adult mosquito should be made, as the insects hide in closets, in the cellar and under the beds. The female anopheles which has never had access to a person with malaria is unable to communicate the disease.

When the anopheles mosquito is present, all carriers and cases of malaria should be carefully screened in such manner that no mosquito can bite them. In Panama it was found that the flight of the anopheles at times exceeds one mile from the breeding place.

The rat. Since the report by the Indian Plague Commission, the work of which was begun in 1905, it has been recognized that, as a factor in international sanitation, destruction of the rat should receive general attention. In the State of New York under present conditions the nurse's part will consist in teaching, where necessary, the method of extermination to be used by householders. In cities, where wharves and large grain elevators exist, rats become very numerous. If the food supply is removed the rats

will migrate; therefore, the first essential is that all refuse which may serve as food shall be promptly placed in metal containers with tightly fitting covers, and that it shall not be spilled on the floor or ground. If rats are present, all foods should be kept in rat-proof closets or storerooms. Concrete, metal and stout close mesh wire screens should be used for the purpose. Careless handling and spilling of food must be avoided. Cleaning up the premises, removal of rubbish, sanitary disposal of garbage, and trapping the rats, in addition to the other measures named, will rid the place of their presence.* For vessels lying at a rat-infested dock the hawsers which tie the boat to the shore should be freshly tarred and protected with inverted cones. Gang planks should be lifted when not in use. If rats are in a vessel it should be disinfected with sulphur dioxide and the dead animals subsequently removed and destroyed, care being taken not to touch the animals with unprotected hands.†

The louse. Three species of lice are sometimes found upon man: (1) *Pediculus capitis or humanus,* the head louse, the ova of which are attached to the hair and known as nits; (2) *Pediculus vestimenti or corporis,* the clothes or body louse, which lives in the clothing and sucks the blood chiefly of the neck, back and abdomen; and (3) *Pediculus pubis or crab louse,* found in the parts of the body covered with short hairs.

Both the head and body lice may transmit disease. They are known to be the intermediary host in typhus fever, and recently it has been demonstrated that the so-called "trench fever" of the soldiers in Europe is conveyed by the louse.

The prevention of lousiness is almost entirely a matter of personal cleanliness. The most scrupulous individuals, however, may become infested. Lice may be passed directly from one person to another, or occasionally may be carried by clothes or other means. Beds in hotels and sleeping cars are sources of infestation.

To destroy head lice. Saturate the hair with crude petroleum or kerosene, being careful of proximity to fire. Tie up the head for several hours, after which saturate with vinegar and again tie up the hair for a short time in a bathing cap or cloth turban.

* Cats are also helpful; while they do not destroy all the rats, they aid in driving them off the premises.

† See, The Rat and Its Relation to Health. Issued by the U. S. Public Health Service.

Wash and dry the hair; remove the dead insects with a fine tooth comb and the eggs with the fingers. Examine the head daily and use a fine tooth comb. The petroleum must be used every second day in bad cases. To be efficacious the heads of other members of the family and of associates must receive suitable attention and treatment. All school children should learn to use preventive care.

To destroy body lice. Bathe frequently with warm water and soap, boil infested garments, burn filthy bedding and clothing which can not be boiled, clean and renovate beds and infested quarters. Studies recently made under the United States Public Health Service have resulted in the adoption of a method of treating persons by means of a gasoline soap spray and shower bath, and of treating clothing and baggage with a vacuum hydrocyanic gas process. Both lice and nits are killed by heating to 158° F. for ten minutes. Dry heat is more effective than moist heat. Perhaps the best substance to anoint the skin with is an ointment made of 5 per cent naphthalin in petroleum.

The bed bug. This insect has become a true domesticated animal and has accommodated itself well to the environments of human habitations. It has no wings but a very flat body which enables it to hide in the narrowest cracks and crevices of beds and walls. It is nocturnal in its habits. The presence of bed bugs in a house is not necessarily an indication of uncleanliness or carelessness. They are apt to get into trunks of travelers or may be introduced in the homes upon the clothing of servants, workmen, etc. They often migrate from one house to another. They thrive particularly in old houses which are full of cracks and places in which they can conceal themselves.

Bed bugs are suspected hosts and carriers of disease. The most effective way of eradicating bed bugs is by a liberal application of gasoline, kerosene, or any other of the petroleum oils. Gasoline is the best remedy when no danger from explosion from an open fire is present. It should be sprayed into crevices of the wood or metal, folds and cracks of the mattress, furniture and walls. In treating metal and hard wood, sometimes gasoline or alcohol may be poured in small amounts into the cracks and then ignited, but this should never be done except by someone with sufficient care and judgment to prevent danger from fire. At times

furniture is so infested with the bugs that it will be necessary to destroy it to get rid of the pests. At other times thorough renovation of the premises is sufficient.

The itch mite. All children who make a practice of scratching themselves or have an irritation of the skin should be examined for scabies (the itch mite). A clean body and clean clothes are the preventive measures. A daily bath in warm water and soap, and once daily boiling the garments worn next to the skin, are imperative in the treatment of scabies. A sulphur or other ointment, if prescribed by a physician in charge, may be applied after the bath. It is important that all infested members of the family be treated until cured, else the disease is passed back and forth from one to another. Interchange of body linen among children and others must be prohibited unless the garments are first boiled. The infested person should not share the crib, pillow and bed of one not having the disease. Unless strict obedience to instructions and perseverance are secured, cases will prove obstinate.

CHAPTER VII

The Nurse and Communicable Diseases

Most large cities now employ one or more nurses who, working under the direction of the health officer, devote their entire time to assisting in the control of communicable diseases other than tuberculosis. In smaller communities the same nurse may in addition devote time intermittently to other important activities including child welfare, school work and care of tuberculosis, the amount of time given to each depending on season, occurrence of communicable disease outbreaks and other local conditions.

There are open to health officials two distinct courses of procedure with reference to communicable diseases; the first, that of attempting to *control* epidemics, the other the more modern and effective method, that of *preventing* them. The prevention of outbreaks requires initiative, constant vigilance, and an adequate force of trained workers who are kept informed as to the latest advances in knowledge of methods and procedure. The most effective aid to a competent health officer in this work is an active, experienced and tactful public health nurse.

The nurse may be called upon to perform any or all of several duties along this line. She may seek unreported or undiscovered cases; visit reported cases and contacts, secure necessary data for record or tabulation and study, give instructions to attendants or members of the family regarding care of the patient, disposal of discharges and other necessary precautions; arrange for care and relief of needy patients and families or supervise quarantine. She should not be authorized, for obvious reasons, to pass upon or confirm diagnoses of attending physicians. In the absence of a school nurse she may make regular inspections of school children when communicable diseases are prevailing and visit absentees in their homes. Whatever her duties, she should maintain a systematic record of work performed.

Whatever her other qualifications the public health nurse must cultivate diplomacy. Coming in contact in an official capacity, as she does, with public officials, physicians and members of

families in every walk of life, success in her work will depend in large measure upon her ability to perform her duties and secure compliance with her instructions with a minimum of friction.

Reporting Communicable Diseases

Communicable diseases can be effectively controlled only if local health authorities have immediate knowledge of the existence and location of each case. Physicians are required by the New York State Sanitary Code to report immediately to local health officers all cases of communicable diseases, excepting syphilis, gonorrhea and chancroid, attended by them. When no physician is in attendance upon a case, a report is required from the head of a school or household, or the person in charge of a hotel, boarding or lodging house, in which the case may be. Visiting or public health nurses, persons in charge of labor or other camps, and of vessels, are required to report under certain conditions.

It is particularly essential that public health nurses in New York State be familiar with the requirements of the State Sanitary Code relative to the reporting of communicable diseases. For this reason there is presented below a list of these communicable diseases together with a table, prepared for the department's manual, "The Prevention and Control of Communicable Diseases," showing by whom, to whom, and under what conditions, reports are required. Nurses employed in municipal work should bear in mind the fact that local health boards have authority, under the Public Health Law, to make further regulations not inconsistent with the provisions of the Sanitary Code, and should be familiar with existing regulations in their own municipalities.

Diseases declared to be communicable by regulation 1, chapter II, of the Sanitary Code:

A. Anthrax
Chickenpox
Cholera, Asiatic
Diphtheria (membranous croup)
Dysentery, amoebic and bacillary

Epidemic cerebrospinal meningitis
Epidemic or streptococcus (septic) sore throat
Epidemic influenza
German measles
Glanders
Measles
Mumps
Para-typhoid fever
Plague
Pneumonia
a. acute lobar
b. bronchial or lobular
Poliomyelitis, acute anterior (infantile paralysis)
Puerperal septicæmia
Rabies
Scarlet fever
Smallpox
Tetanus
Trachoma
Tuberculosis
Typhoid fever
Typhus fever
Whooping cough

B. Syphilis
Gonorrhoea
Chancroid
Ophthalmia neonatorum (suppurative conjunctivitis of the newborn)

REPORTS REQUIRED

Persons of whom reports are required	When?	What?	To whom?	By what law or regulation?
Physicians	Within twenty-four hours of time cases are seen.	Persons affected with communicable disease other than gonorrhea, syphilis and chancroid.	Health officer	Code, chapter II, reg 2 *.
Physicians	Immediately	Cases of cholera, diphtheria, dysentery, epidemic meningitis, septic sore throat, typhoid and paratyphoid, scarlet fever, poliomyelitis, or smallpox on dairy farm.	Health officer	Regulation 8
Heads of hospitals, dispensaries and other institutions.	Immediately upon development of disease or admission of patient.	Cases of communicable diseases in persons under their charge.	Health officer	Regulation 3
Medical inspectors of schools.	Immediately	Cases of (certain) communicable diseases in school children.	Health officer	Educ. Law, article XX-A, section 575
Persons in charge of schools (principals, etc.).	Immediately	Children who appear to be affected with disease presumably communicable.	Health officer	Regulation 4.
School teachers	Immediately	Children in their charge who appear to be affected with diseases presumably communicable.	Principal or person in charge of school.	Regulation 4.
Attendance (truant) officers.	Immediately	Children apparently affected with communicable diseases not under observation of health officer.	Principal or person in charge of school.	Special regulation, state departments of education and health.
Heads of households, proprietors or keepers of hotels, boarding or lodging houses.	Immediately	Persons in such places who appear to be affected with disease presumably communicable.	Health officer	Regulation 5.
Owners or persons in charge of dairy farms.	Immediately when no physician is in attendance.	Any person affected with a disease presumably communicable employed or residing on farm.	Health officer	Regulation 9.
Nurses and persons in charge of camps.	Immediately	Any person affected with disease presumably communicable who, by reason of danger to others, seems to require attention of public health authorities.	Health officer	Regulation 6.
Persons in charge of vessel lying within jurisdiction of State.	Immediately	Persons on vessel affected with disease presumably communicable.	To health officer of such municipality as commissioner of health may designate.	Regulation 7.
Registrars	Immediately	Deaths from communicable diseases.	Health officer	Public Health Law, ch. 559, sec. 320, San. Code, regulation 42-b, chap. II.
Health officers	Immediately	Cases of communicable disease reported as above.	State department of health.	Public Health Law, art. III, sec. 25.
Health officers	Immediately	Cases of certain communicable diseases on dairy farms.	State department of health by telephone or telegraph.	Regulation 8.

* Regulations referred to are in chapter II of the Sanitary Code unless otherwise specified.

Regulation 8, chapter II of the Sanitary Code, which refers to the reporting of cases of certain diseases occurring upon dairy farms, is especially important because of the danger of transmission of the infective agents of these diseases to large numbers of persons through the infection of milk.

Each year, as education progresses and the legal requirements are more strictly enforced, the proportion of unreported cases grows less. However, a study of returns made to the State Department of Health shows clearly that a large number of cases especially of the so-called "minor" communicable diseases — such as measles, German measles, chickenpox and whooping cough — are still not reported. Failure to comply with the requirements of the law are variously accounted for; most frequently by carelessness on the part of physicians and failure to arrive at a diagnosis or ignorance on the part of heads of households of the requirement in regard to reporting when no physician is in attendance. It is a duty of a local health officer to see that every person in his community upon whom the law places a responsibility is given reasonable opportunity to become familiar with the law and then to prosecute persistent or wilful violators when adequate legal evidence is at hand.

Inability to arrive at a diagnosis may occasionally constitute a reasonable excuse for failure on the part of a physician to report a case of communicable disease. This excuse will appear less frequently when it is generally understood that in at least many instances the plea of inability to make a diagnosis of a communicable disease reflects upon the initiative and skill of the physician. The Sanitary Code requires physicians to make cultures and submit them for examination in all cases in which there is reason to suspect the existence of diphtheria, and to submit blood specimens for the Wassermann test in cases suspected of having syphilis and for agglutination tests whenever there is reason to suspect the existence of typhoid or paratyphoid fever. Unless a physician has resorted to these or other appropriate and readily available laboratory aids, failure to arrive at a diagnosis within a reasonable length of time should not be regarded as an acceptable excuse.

While it is the duty of a public health nurse to bring to the attention of the local health officer any case in which she suspects the existence of a communicable disease, it is also a fact that busy health officers are at times unnecessarily annoyed by being called upon to visit cases when such suspicions are not well founded, This is particularly true in rural communities in which health officers are busy practitioners and where a visit to a suspected case may involve traveling a considerable distance. Unless the nurse is skilled in the detection of communicable disease or is acting under local instructions, she should endeavor to have her suspicions promptly confirmed by a physician — whether by the family, school, or other physician depending upon circumstances. Pending the result of his investigation, she should keep the case under observation and endeavor to see that necessary precautions are taken.

Information Regarding Communicable Diseases

It is impossible, in a work of this kind, to enter into a detailed discussion of all the common and important communicable diseases. The Division of Communicable Diseases has prepared for distribution a series of circulars containing essential information regarding the various common communicable diseases. It has also prepared for the use of health officers a manual, "The Prevention and Control of Communicable Diseases," in which are outlined the essential points in the epidemiology of the various diseases. A pamphlet entitled "Cooperation in the Control of Communicable Diseases among School Children" deals particularly with the prevention and control of school outbreaks, and contains the special rules and regulations of the State Departments of Health and Education for exclusion from school of children suffering from communicable diseases or in whose homes cases occur. Two circulars, "The Conduct of an Isolation Period for Communicable Disease in a Home" and "Regulations and Instructions for Cleansing and Disinfection," give detailed advice regarding procedure and precautions in caring for cases in the home. The "Public Health Manual" contains the State Sanitary Code together with important sections of the Public

Health, Education, Penal and other laws, portions of which relate to the control of communicable diseases.

One who has carefully studied these various publications will have acquired a fairly adequate working knowledge of the prevention and control of communicable diseases. All of them will be sent to any public health nurse upon request. It is suggested that they be secured and maintained as a "working library," to be used in conjunction with this manual.

Upon request, the name of a public health nurse will be placed upon the mailing list for HEALTH NEWS and THE PUBLIC HEALTH NURSES' BULLETIN which are published monthly and for the various bulletins issued by the Department. These contain articles covering current information in regard to communicable diseases, as well as other material of interest to health workers. The bulletins constitute an official medium of communication with health officers and nurses through which they are apprised of amendments or additions to the Sanitary Code or laws relating to health administration. These can be conveniently bound by use of "ring binders" which can be purchased at any stationery store at small cost.

SYPHILIS AND GONORRHEA

Syphilis and gonorrhea should be considered among diseases common to adult life. Since their etiology has been established it has become possible to estimate their prevalence in a community by a careful study of its social life. Certain social conditions have been proven to definitely increase their prevalence and during the recent war advantage was taken of this knowledge to produce conditions that would tend to prevent their spread. The results attained were very promising and justified a continuation of the campaign on a wider scale. The program adopted to produce these favorable conditions is three fold: First, a vigorous educational campaign is necessary; for all classes of society are alike ignorant of the true nature of these diseases, their communicability or the possibility of their cure; second, facilities for diagnosing and treating the diseases must be made available. Owing to a reluctance on the part of the public in the past to acknowledge or speak of diseases of the generative organs and the

cooperation of the physicians in this evasion, their intelligent and successful treatment was possible at only a very few dispensaries and specialists' offices; third, social conditions must be developed that will eliminate the foci of infection and limit the activities of the carriers.

The principal agents upon whom the burden of this new program rests are the public health officials, and of these the public health nurse has unusual opportunities. Her duties will not only bring her in touch with all those who come to the dispensaries but in her follow-up work she will come in contact with other members of the family and community, and this may prove to be her largest field.

It is highly important, therefore, that she be adequately qualified to do social work. Patients coming to the venereal disease clinic are usually not very ill, frequently they are not uncomfortably incapacitated and therefore they do not hesitate to discontinue treatment if the least inconvenience is encountered, unless they have been carefully impressed with the seriousness of their condition. Proper advice and instruction should be given the patient by the physician on the occasion of the first visit, but in many cases it will be necessary for the nurse to continue this education in order to keep the patient under treatment.

It is not an unusual experience for a nurse to have several members of a family, in some instances both parents and children, visit the clinic for examination after one of her visits to the home of a patient. Some patients, by changing their residence, lose contact with the clinic unless the nurse keeps in touch with them.

Three classes of persons with whom the nurse will work are the uncured, the untreated and the undiagnosed. Her first work is with the uncured patient who starts treatment at the dispensary. Her specific qualifications in such cases are tact and sympathy. These patients are usually unduly self-conscious of their condition and often feel that they are despised because of their infection. If they are convinced that a cure is possible and that those connected with the dispensary are seriously interested in treating them, their enthusiastic cooperation is the rule.

While working among the uncured patients the nurse will find persons who need treatment but are not receiving it. Among

these will be found some who started treatment with a private physician and stopped before they were cured, some who are ignorant of the necessity for treatment or do not know where to go to be treated, and some who realize that they are ill but do not recognize the disease. All of these should receive the nurse's immediate attention. If those persons who are aware of the nature of their infection are told of the clinic and encouraged to visit it, they usually do so, but those who are ignorant of the true cause of their illness are frequently less tractable. It may be that these patients have made their own diagnoses, or it may be that a physician was consulted years ago and the patient assumes that the present trouble is a continuation of the previous sickness. Such cases should be persuaded to visit their family physician, if they have one, or to go to the dispensary where the proper specimens can be taken. The nurse should qualify herself so as to be able to take specimens from women where gonorrhea is suspected. Sometimes it is more desirable to have the first laboratory specimens for the diagnosis of gonorrhea taken from women or children in their homes and not to have them visit the clinic until treatment is begun.

Finally there are those persons but recently infected in whom the disease has not been diagnosed. There are two groups of these which we should consider. First, those cases that have not been discovered, and where the patients may or may not know they are ill. It may be a primary sore that attracts the attention of the nurse or a secondary rash and indisposition may cause the patient to speak of himself. There are many signs and symptoms that should arouse the nurse's suspicion, but it must be remembered that the diagnosis should always be made by a physician and that he should always confirm his clinical diagnosis by having a laboratory examination of the proper specimens. The nurse should, however, invariably report all such suspicious cases with her reason for so doing either to the family physician or to the physician at the clinic and be advised by his judgment with regard to further action. The second group includes those persons, who have been unconsciously exposed to either of the diseases. It is among this group that the nurse will be called upon to do her most tactful educating. If a father has just recently

contracted gonorrhea or has a recurrence of his earlier infection, the greatest care must be taken to keep the infection from spreading to other members of the family. A member of a family who has contracted syphilis and who has taken precautions while the primary sore existed may not realize the sore mouth he now has is another stage of the same disease. One can readily see how entire families may be infected innocently from one of their number having undiagnosed mucous patches in the mouth. These conditions must be borne in mind by the nurse when she visits the home of a patient who is attending a clinic.

Another contact that is urgently in need of the advice of the nurse is the pregnant mother. The nurse should see that she is examined very carefully by a physician, for if infected and treatment is instituted early enough, a well infant may be born. When we consider the great number of stillbirths and deaths of infants under one year of age due to syphilis alone, we can understand the importance of this investigation. Persons with either acute or discharging lesions of gonorrhea or syphilis must not be permitted to care for children if it can be avoided. If there is no alternative then they must be most carefully instructed in how to avoid infecting their charges.

The public health nurse should cooperate with other specializing nurses of her district. If there is a regularly appointed venereal disease nurse she should be informed by the public health nurse of her investigations and discoveries. If there is no venereal disease nurse in the district, then the public health nurse should learn from these specializing nurses who work in her district the discoveries which they make and the suspicions they have of the presence of either syphilis or gonorrhea and should assist in investigating them. Instances are recorded where destructive pharyngitis or suppurating glands were treated for years as tuberculosis, until a more careful search of the contact conditions proved them to be of syphilitic origin.

This in a brief way outlines some of the opportunities of a public health nurse in the therapeutic control of venereal diseases; but she has another large field in the social welfare of the community.

Every community has a number of social agencies that are interested in the control of communicable diseases. Many of these

are anxious to assist in preventing the spread of venereal diseases but they are not working at maximum efficiency because they are not cooperating in a common program. Usually these committees as for example tuberculosis and child welfare committees, have been organized for some special work and as that progresses they have gradually taken up other activities or would willingly assist in other community service if they were properly directed. The nurse should devise a plan to bring together social agencies and the law enforcement authorities. The cooperation of police magistrates, probation officers and those in charge of wayward girls should be secured in carrying out a general scheme instead of impersonally administering the law.

Civilian committees should be stimulated to provide machinery which will tend to restore these unfortunates to that station of society from which they came before they fell into the hands of the law. This is a very large field and one in which much work remains to be done. No person is so well equipped as the nurse to restore confidence, both in the patient herself and in those who should be interested in her. She can at the proper time report the freedom of the patient from infection and assist in selecting her employment. This interest shown by the nurse will be most helpful in restoring self-respect to the patient. The defective girl will be discovered by her and proper care secured so as to prevent her continuing the life from which she was rescued; if institutional care is indicated it should be secured. If the nurse can demonstrate to a community its share in the responsibility for the care of such patients she will have accomplished much for the future health of the people.

Relief committees and organizations such as settlements and the Salvation Army posts should be interested in securing treatment for the infected which they encounter. They are always very glad to cooperate with the nurse but they must be interviewed and a definite plan outlined. Local commercial and industrial associations must be interested. It will be found that many of these organizations have already started work according to their own plans and it will only be necessary to coordinate this with the community work.

A fourth activity is to provide adequate recreational opportunities for the young people and to secure proper supervision over

those which are already functioning. This is a most important piece of work and great care must be exercised in choosing the committee which will have it in hand. They must be possessed of sound judgment and must be appreciative of the demands of the young people. Experience has shown that a sufficient variety of well organized places of amusements where the young people can feel free to do what they wish, provided there is order and decency, will do more toward controlling the spread of venereal infection than many laws.

The public health nurse may find when she starts work that, unless she has been specially trained, the social service phase of her activities will be exceedingly difficult. Even if she has been trained in social service methods in one of the larger cities, these will have to be greatly modified to be of value in the rural districts. This must not discourage her. She must make the start, relying on her tact and common sense to guide her. One great temptation which she must early learn to avoid is the devotion of too much time to the individual case. Her work is community work and preventive in character rather than therapeutic. Therefore when she sees an infected person her first reaction should be to protect the well and to limit the contacts. She will be called upon to give advice more often in venereal disease work than in any other but she must remember to speak advisedly and always to refer these people to the physician for diagnosis and specific advice. Her position as an educator is an important one and she should always try to find time to "talk it out" with a mother or girl who is puzzled over some sex problem. Mothers will want her to help them to instruct their children and the nurse should be prepared to offer helpful suggestions; especially should she teach the mother the correct names of the generative organs. Much of the reluctance of the average person to talk of sex matters is removed when his or her vocabulary is enlarged to contain these correct terms.

In a word, the public health nurse's work will be medical, social and educational. Some clients will require all three, others but one or two, and the nurse will be obliged to determine which they need from her observation at the time of the visit. Whichever is indicated should be given, for all are equally important and valuable to the community.

CHAPTER VIII

Public Health Nursing and Tuberculosis

Tuberculosis, a communicable disease, is preventable and curable. Because of its great frequency, wide distribution and the vast amount of suffering which it causes, it is the most important disease with which public health workers are concerned. The many and complex underlying sanitary, economic, social and industrial factors responsible for its prevalence, make its practical control exceedingly difficult.

There are numerous and varied agencies concerned directly or indirectly in the fight against tuberculosis. Of these the tuberculosis hospital is undoubtedly the most important single agency; the tuberculosis visiting nurse ranks next. In this chapter are described the duties of and procedures to be followed by nurses engaged in tuberculosis work.

For details regarding the nature of the disease, its causes, symptoms and treatment, the reader is referred to the pamphlet entitled, "What You Should Know About Tuberculosis."

Tuberculosis may attack any individual, regardless of age, sex, race, or social status. It is, however, becoming a class disease, i. e., "a disease of the masses." In this country it kills annually between 150,000 and 160,000 (about 9 per cent of all deaths), and of this number the pulmonary form causes over 80 per cent. About one-half of these deaths occur in individuals between 20 and 40 years of age. It has been estimated that out of the present population of 100,000,000 in this country about 9,000,000 will succumb to this disease unless the proper measures are carried out.

From the results obtained at Framingham, Mass., it would appear that for every death from tuberculosis, there are at a given time about eight active cases of the disease, of which between six and seven are pulmonary tuberculosis.

Tuberculosis of the lungs is the type of the disease with which the public health nurse will be most concerned; therefore what follows relates mainly to pulmonary tuberculosis.

The following classification is the one ordinarily used to designate the several stages of the disease:

Incipient (beginning): There is very slight affection of one or both lungs. There are no severe symptoms, such as high fever, rapid pulse, dyspnea, great weakness, large hemorrhages, or severe cough and much expectoration. Tubercle bacilli may be present or absent. No other part of the body is tuberculous and there is no other illness. Under proper treatment 3 out of 4 patients in this "early" or "curable" stage apparently recover.

Moderately advanced: There is a larger area of involvement, but not much lung tissue has been destroyed and while the patient has, as a rule, more marked symptoms of the disease he has no serious complications and is not usually physically incapacitated. About 1 out of 5 moderately advanced patients apparently recover under proper treatment.

Far advanced: The patient has a large area of lung affected, and his lung tissue is being destroyed. His symptoms are marked and severe; he often has serious complications and is practically incapacitated. Only 1 out of about 150 to 200 patients in this stage apparently recover.

After treatment, one of the following conditions will be found:

Unimproved: Condition is the same as when treatment was begun or else the disease has advanced, when it is called a *progressive* case.

Improved: The patient's symptoms have improved, but he may still cough and expectorate tubercle bacilli.

Quiescent: The disease in the lungs is stationary or improving and while the patient may or may not cough and expectorate tubercle bacilli his other symptoms are practically absent and this condition has continued for at least two months.

Apparently arrested: The diseased lung tissue has become healed and all general symptoms and expectoration of bacilli have been absent for three months. When this condition persists for six months, the case is considered *arrested.* When an "arrested" case remains so for two years under ordinary conditions of life it is *apparently cured.* As long as the patient is discharging tubercle bacilli he is an *infectious,* and an *open* case. When this giving off of germs has not yet begun or else has ceased, the case is *noninfectious* or *closed.* It is obvious that only the open cases

will transmit the disease to others when proper precautions are not taken. In very many of the really incipient cases tubercle bacilli are not found in the sputum as ordinarily examined; occasionally a far advanced patient may not expectorate bacilli. However, a noninfectious patient may at any time become infectious, which fact is of the utmost importance in connection with the prevention of the spread of the disease to others.

MEASURES FOR PREVENTION AND CONTROL

The measures to be taken to control tuberculosis, to prevent its spread, and to lessen its incidence with the hope of ultimately eradicating it, must be aimed first at preventing infection. When this has occurred active disease should not be allowed to develop; if it does the patient should be cared for in such manner that not only will he be prevented from transmitting it to others but will himself if possible become arrested or apparently cured. Finally, after arrest has taken place, recurrence or reinfection must be guarded against.

Practically, these aims require an enormous number of agencies all working at maximum efficiency and in harmonious cooperation. The necessary measures have been determined and whenever and wherever they have been properly carried out excellent results have followed.*

To prevent infection necessitates that the tubercle bacillus be located and destroyed at its source. Since this is not always possible, every individual should be taught to take the proper precautions in coughing, sneezing, spitting, or otherwise contaminating persons or objects with his discharges.

Every case of tuberculosis should be located at the earliest possible moment; it is essential that early diagnosis be secured. For this purpose all physicians should be educated in present day methods, and clinics and dispensaries where specially qualified men can be consulted should be available. All persons suspected of having tuberculosis should be repeatedly examined until a definite diagnosis is made. This applies also to those who have

* Their employment benefits not only the tuberculosis situation but also, directly or indirectly, assists in the solution of many other public health and welfare problems.

come into more or less intimate and prolonged contact with tuberculous patients in the home, factory, mill, school, etc. As an aid in diagnosis, free laboratory examinations of sputum and other suspected discharges should be made by local or state laboratories. It should be emphasized that, whenever possible, a diagnosis should be made without waiting for a positive laboratory finding.

All cases of tuberculosis must be reported by physicians to the health authorities, who must record them and maintain constant direct or indirect supervision over them until they are apparently cured or have died. In the event of a patient leaving the jurisdiction of one health officer to go into that of another, this fact must be reported to the latter so that he may begin supervision at once.

All reports of suspected cases made in writing by any responsible individual (which reporting is authorized and should be encouraged) must be investigated by the local health officer; he is required to make every effort to determine whether or not the case is tuberculosis. In the meanwhile the precautions required of positive tuberculosis cases should be applied to suspects.

Isolation or segregation of all patients with tubercle bacilli in their sputum, and especially the advanced and helpless case, is obviously essential. Such isolation is best secured at a tuberculosis sanatorium or hospital; if this is not practicable isolation should be required at home. In the latter case, the following procedures and precautions, prescribed by the New York State Commissioner of Health, must be carried out under the supervision of the attending physician, health officer or nurse:

PROCEDURES AND PRECAUTIONS TO BE TAKEN ON THE PREMISES OCCUPIED BY A PATIENT HAVING TUBERCULOSIS

Care of sputum

The patient should spit into a paper sputum cup; burn this cup and its contents daily or oftener; hold a handkerchief or cloth before the mouth when coughing or sneezing; use paper napkins or gauze handkerchiefs, which can be burned daily; should not swallow sputum; avoid soiling hands with sputum — (if this occurs the hands should be thoroughly cleaned with hot water and soap); thoroughly wash with hot water and soap any article accidently soiled with sputum; should not kiss anyone (it is especially dangerous for the patient to kiss children); should not handle raw food unless the hands have been thoroughly washed with hot water and soap.

Care of premises, eating utensils and linen

Dry sweeping and dusting should be avoided; dust from any source should be prevented, if possible; patient should, if possible, be provided with a separate bed and room, preferably a room which admits much air and light, especially sunlight; patient should have separate dishes, linen and handkerchiefs and other articles for personal use, and these should be washed and cleaned separately.

Other precautions

Patient should not associate freely with children and should with very special care observe all precautions in their presence; all members of the patient's family and other household associates should be carefully examined for tuberculosis.

All apartments or premises vacated by the death or removal of a tuberculous patient must be cleansed, renovated or disinfected as the case may require.

A tuberculous individual should not prepare or in any way handle food intended for others which will not be cleansed or cooked before consumption; he should therefore not engage in such occupation as cook, baker, butcher, milk dealer, etc. Dusty trades, because of the irritant effects of the dust, should be avoided. To prevent infection from tuberculous cows, milk and its fresh products should not be used unless pasteurized except in cases where the cows have been tuberculin tested and shown to be free from tuberculosis.

In order that the individual may himself prevent taking in the germs of tuberculosis he should avoid prolonged and intimate association with persons known to have tubercle bacilli in their sputum, especially if the latter do not strictly carry out the precautions prescribed. Sleeping in the same bed, or working in the same room with a tuberculosis patient, if such workroom is small and not well aired and sunned, is especially dangerous. He should not use common drinking cups, or should he put fingers or other objects which do not belong there into the mouth. He should never handle food with unwashed hands. Dusty atmospheres and dark, damp, ill ventilated rooms, whether in the home or elsewhere, should be avoided by him. Decayed teeth should receive proper attention as well as any defects of the nose or chest interfering with proper breathing. Children require special protection because they are more apt to become infected than adults.

If infection has occurred and, unfortunately this is probably the case in a large part of our present population, it is essential

that the individual resistance both general and local be maintained at as high a level as possible. The public as a whole should see to it that conditions in the home, factory, mill, school, etc., be so improved that there is no overcrowding, and that there is supplied to everyone an abundance of fresh air and sunshine. Economic and social defects should be corrected as far as possible. Better wages and lower cost of living tend to reduce poverty and want and sufficient holidays and vacations, parks, playgrounds, allow for the necessary amount of recreation. The individual should avoid intemperance or excess in work or play and dissipation of any kind. The diet should be generous and include fat food which tends to increase the resistance against infection; rest, fresh air and sunshine are essential, as is also the avoidance of the diseases and conditions mentioned above as predisposing to the development of the disease. Children from tuberculous families, those who are anemic and the so-called pretuberculous, should be cared for in preventoria or in "open air" schools, where the physical care of the child takes precedence over its education. Preventorium treatment for "run down" adults is also most desirable.

When the disease has developed, every effort should be made to obtain its arrest. For this purpose treatment at a sanatorium or hospital is by far the most desirable; that at a camp or at home under the supervision of a dispensary or class ranks in value in the order given.

When the disease has been arrested every effort should be made to avoid a recurrence or a reinfection.

The general public, including the tuberculous individual, requires enlightenment as to the tuberculosis problem so that the necessary statutes may be enacted and properly enforced, and institutions and other agencies, public and private, established and maintained. The public should be made to understand thoroughly that the tuberculous patient should not be shunned, but so aided that he will not only not be a menace to the community but also be restored to useful citizenship.

THE TUBERCULOSIS NURSE

In New York State, nurses engaged in tuberculosis work are employed in one of several ways. In counties where the establishment of a tuberculosis hospital is mandatory, the board of managers of such hospital is required and in other counties the board of supervisors is authorized to "employ a county nurse, or an additional nurse or nurses, if it deems necessary, for the discovery of tuberculosis cases and for the visitation of such cases and of patients discharged from the hospital and for such other duties as may seem appropriate." Under the authority of the public health law, the board of health of any municipality may appoint such nurse or nurses. Local tuberculosis organizations, county or city, employ visiting nurses either alone or in conjunction with some public agency. Depending upon how these nurses are employed, their fields of activity will necessarily vary as will the scope of their duties, though to a minor extent. For instance, a nurse employed by the local health authorities acts as the representative of the health officer and as such has certain official duties and responsibilities which the private nurse does not have. Or a nurse attached to a dispensary acts as the physician's assistant, taking temperature, pulse, respiration and weight, recording same, preparing patients for examination and amplifying the physician's instructions. In the main, however, their activities are practically identical; what follows is generally applicable.

Depending upon the size of the locality, and the amount of tuberculosis work already done, the nurse may have such functions to perform as will arouse sentiment in the community for development of tuberculosis work or more active prosecution of that already begun. It is advisable for the nurse on entering her field to make a survey or study of all conditions and factors relating to tuberculosis in the community. This should include a tabulation of the actual number of reported cases and deaths, and the numerical ratio between these and information regarding all institutional and other facilities. The attitude of the physicians and cooperating public health agencies, any systematic work already undertaken or proposed, the enforcement by local health officers of the

tuberculosis law and any other conditions which may affect the local situation should be known to her. Such a survey will serve as a basis for the planning and carrying out of her duties. She may encounter either inertia or actual opposition, due to ignorance or prejudice on the part of individual patients and their families or of other members of the community. Regard for racial, religious and local customs is necessary; in order to accomplish results — and really large and important results can and should be obtained — it is essential that she exercise good judgment, tact, patience and kindness in addition to her knowledge and skill.

Discovery of Cases*

The nurse should obtain from the health officer a list of all reported cases of tuberculosis; such report is required of all physicians, and the local health officer is obliged to keep a confidential register of cases. Since these records are open to inspection only by the health authorities of the State and the city, town or village concerned, except by special authorization of the State Commissioner of Health, the nurse, if not employed by or operating under the local health authorities, should request such authorization from the State Department of Health through a responsible officer of the organization employing her. The nurse must not publish or divulge for publication or communicate to any other person the identity of the persons to whom such reports or registers relate. From the local registrar of vital statistics a 3–5 year list of deaths from tuberculosis should be obtained.†

The ratio between the number of reported cases and of deaths should be studied. If it is found that the number of deaths equals or exceeds the number of reported cases it can be properly assumed that there are a large number of unreported and concealed cases, in view of the fact that we estimate that at a given time there are

* Since going to press more effective and desirable methods of discovering cases by means of surveys with clinics have been instituted. A special pamphlet on the subject will be prepared and issued.

† On application the State Department of Health will furnish to all duly authorized nurses lists of cases and deaths, spot maps and other necessary and useful data and information regarding the local situation.

8 active cases to every death. This assumption is also proper if this number is smaller than would be expected from the size and character of the community.

School teachers, settlement workers, clergymen, attendance officers, juvenile court officers, employers of labor, etc., often can and should advise the nurse of cases known to or suspected by them. In some instances a house to house canvass may be necessary; but this should be undertaken guardedly and only with the knowledge of the health officer and the consent of the physicians in attendance upon suspected cases.

The next step is to visit all reported cases, ascertain their general status, discover whether they have been admitted to or returned from a hospital or sanatorium, or have moved, changed physicians, evaded oversight or died, and bring the living under supervision if necessary. Before making such visits the nurse should obtain the cooperation of the health officer and of the physicians; she should call upon the latter and obtain from them the necessary data concerning their "private" tuberculosis cases or, if necessary, arrange to visit such patients for this purpose. She should discuss with the physician the need for and desirability of her visitation of patients not reporting frequently to the physicians and of families, in which there has been a death from tuberculosis, in order to obtain data as to the physical condition of the remainder of the family. She should offer to visit positive or suspected cases or former tuberculosis patients to ascertain their present status and to urge their reexamination. It is essential that the nurse avoid any actions which may meet with the disapproval of the physician whose consent and cooperation should be obtained in advance. It is inadvisable to visit a home immediately after the death or burial of a patient; a wait of one week at least is desirable. Where the necessary data may be obtained from the health officer, attending physician, other visiting nurses, county welfare agent, social service agent, etc., a house visit will be unnecessary. Where the family is being called on by another nurse the data should be obtained from her if possible; otherwise the latter should introduce the nurse making the survey. Every

endeavor should be made to have all suspected cases examined to determine whether they have tuberculosis. This should likewise be done with all "contacts," including all members of the household, or of the factory, mill, or shop who have been exposed by living or working with the known case or cases. The individual in question should first be referred to his usual attending or family physician. If he can not afford to pay the physician for his services the latter should be informed of this fact; very often he will make an examination without charge. If this is not possible, the case should be referred for examination to the dispensary, if there is one, or to the county tuberculosis hospital superintendent.* In counties where no tuberculosis hospital exists the case should be referred to any competent examiner. Under the provision of regulation 42-a of chapter II, Sanitary Code, the local health officer is required, if the alleged case has not been previously reported to him as having tuberculosis, to take proper measures to determine whether there is reason to believe such person is affected with pulmonary tuberculosis. Suspects who refuse to consult a physician and to observe the necessary precautions should be complained of in *writing* to the local health officer.

Suspected cases and those who have been exposed should be kept under observation until the medical adviser considers them either positive or no case. If the suspected case has been referred to a dispensary by a lay social worker, the nurse should not assume charge of the case unless the diagnosis is positive and the dispensary itself requests the service of a nurse. If the social worker continues to visit the family, she should attend to the matter of obtaining reexaminations, calling on the public health nurse when necessary. If the nurse, however, must visit the family for other purposes she assumes the sanitary oversight of the patient if no physician is in attendance, and the local health officer has delegated the nurse to act for him in maintaining such oversight. If a physician is in attendance the nurse

* Section 47 of the County Law provides that the board of managers of county tuberculosis hospitals shall cause to be examined by the superintendent or one of his medical staff suspected cases of tuberculosis reported to it by the county nurse, or by physicians, teachers, employers, heads of families or others.

acts under his direction. If the nurse continues her visits she should secure the examination and reexamination of the contacts until a definite disposition is made of them. If, however, the patient leaves home or dies, and there is available another worker who is still visiting the family, the latter should assume the follow up work.

EXAMINATION OF SPUTUM

In every instance where an individual has had a cough persisting for one month or longer the nurse should endeavor to have an examination of the sputum made. The necessary jars and blanks may be obtained from the local health officer or laboratory and the examination made either at the local or state laboratory. Full information as to obtaining sputum and data for forwarding of specimens (which last should be done through the health officer), is given on the blanks. In this connection it is necessary to emphasize the fact that, while the discovery of tubercle bacilli in the sputum is positive evidence of the existence of the disease, failure to find them does not negative its presence. Repeated examinations, at least three and often more, are necessary before a definite statement as to the patient's not being tuberculous, based on sputum findings, may be made. It should be remembered that when tuberculosis is present a positive diagnosis can and should be made by a competent examiner even though the sputum be negative, since some advanced cases do not expectorate tubercle bacilli. It is of course obvious that while a case with negative sputum may not be dangerous to others, such sputum may at any future time contain the bacilli and the patient thus becomes a menace.

DISPOSITION OF PATIENTS

When it has been determined that an individual has active tuberculosis his disposition requires prompt attention. In considering this matter it should be borne in mind that the interests of the individual and those of his family and of the community at large are best served by having the patient sent to a sanatorium or hospital. For the individual, in the vast majority of cases, this assures the best treatment and therefore the greatest opportunity

for an arrest in early cases, or a prolongation of life in some comfort for those with advanced disease. Furthermore, the lessons learned at the sanatorium by the patient with early disease, even though he does not stay until it is entirely arrested, will be of great assistance to him in completing the "cure" at home. The discharged patient is very often an effective and serviceable health teacher and missionary. From the standpoint of the family, the patient's presence at home would entail avoidable and unnecessary hardships, which are in great part obviated by his admission to an institution. This also removes a source of infection from the family and the community.

Efforts should be made to have every case admitted to an institution if possible. Unfortunately existing institutional facilities are not adequate to care for all cases. In New York State, for instance, the provision of one bed for each annual death from the disease is being secured. It is obvious that with such provision (the best now obtainable), all cases can not be accommodated. However, there are many tuberculous patients who either can not or will not enter an institution because of personal or family opposition, economic and financial difficulties, etc. The following general rules regarding hospitalization of tuberculosis patients are believed to be practicable. If it is not possible to have all cases admitted, all open cases where there are children in the household should be transferred to an institution at once. Home treatment may be substituted when there are no children in the household and when it is possible to obtain facilities at home for the proper outdoor treatment under favorable hygienic conditions. If home treatment is to be successful, adequate nursing and medical supervision over a sufficiently long period, with a patient and family intelligent enough to carry out all details, are essential. Any tuberculous person who either will not or can not so conduct himself as not to be a menace to others should be forcibly removed to a hospital, as provided for in section 326-a of the Public Health Law (see pamphlet, "Compilation of Tuberculosis Laws," furnished by the State Department of Health). Where hospital treatment is not available, the patient should be admitted to a camp, if there be one. If he remains at home he should be kept under the observation of a private physician or a dispensary, or a tubercu-

losis class. No disposition of any patient should be made by the nurse without first securing the advice and consent of either the regular medical attendant, the dispensary physician or the health officer. This is essential as there may exist certain contraindications such as complications which would make high altitude or removal inadvisable. Children suffering with pulmonary tuberculosis should be sent to an institution, as also should those who have bone, joint, and gland tuberculosis. Unfortunately existing institutional facilities for the care of tuberculous children are very limited; they should be extended. Those children who, while not actively tuberculous are nevertheless weak and poorly nourished, whose home conditions are undesirable, and who have been extensively exposed to the disease, should, if possible, receive care in a preventorium camp or open air class. The adult who is "run-down" can also derive a great deal of benefit from preventorium care where such is available.

In the case of patients discharged from a sanatorium as arrested, or of those in whom the disease is inactive, the matter of after-care should receive the nurse's attention. These individuals require close medical and nursing supervision in order that the good results which have been obtained may continue. The details as to rest, outdoor treatment, occupation, etc., depend on individual cases and should be prescribed by the physician. It is advisable that the patient be examined once a month; he should be informed as to the possibility of his having to return to an institution on the appearance of evidences of a relapse.

HOME SUPERVISION

The patient who remains at home obviously requires medical and sanitary attention, and in many instances, material relief. The first of these should be given by a private physician or a dispensary as the circumstances necessitate and allow. Under the New York statute sanitary care must be given either by the physician or by the health officer. The physician in reporting a case of tuberculosis is required to signify his willingness to perform this duty; if he will not or can not maintain sanitary supervision this devolves upon the health officer. If the nurse is acting under the latter's direction this duty may be

delegated to her, in which case she exercises full sanitary control independently of the attending physician, who may, however, continue to attend the patient. Physicians in attendance upon tuberculous cases often request the services of a public health nurse for the purpose of maintaining sanitary supervision. Under these conditions the nurse acts under the direction of the physician in advising and instructing the patient and his family. If the physician is only nominally in charge or unwilling or unable to maintain sanitary supervision, this duty devolves upon the nurse as the representative of the health officer. A health officer has authority to have all reported cases of tuberculosis in his jurisdiction visited by a public health nurse.

The public health nurse employed by public authorities can make no distinction between the poor and those able to pay in providing *sanitary instruction,* since this is intended to promote the public health generally.

The public health nurse's work includes sanitary instruction and advice as to the patient's well being, subject to the orders of the attending physician, if there be one. Her functions in the home are primarily of a sanitary nature; nursing, as such, is not to be given except insofar as it may be necessary for purposes of instruction, in an emergency, or to gain the confidence and good will of the patient and family. Where prolonged bedside nursing is necessary, a private nurse should be secured, if the patient can afford to pay, and if not a visiting nurse's association should be requested to supply such service.

The statute requires that every reported case of tuberculosis be furnished with a circular of information regarding the best method of treatment of tuberculosis and of the precautions necessary to prevent its transmission to others. Such circulars are supplied by the local health officer through the physician, if there is one in attendance, or else direct to the patient.

While the circular of information is very useful and, theoretically, should supply the patient and his family with all the necessary information, practically it is necessary that the nurse give personal instructions and demonstrations. This should include information regarding the nature of the disease and the danger of its spread to others, the method of proper disposal of

sputum or other infectious discharges, both in the home and when abroad, keeping the hands free from infectious material, avoiding the contamination of objects which may be used by others, the avoidance of unguarded coughing and sneezing and of putting fingers in the mouth, and the prevention of contact infection in the family. The danger of having the patient prepare food to be eaten by others should be stressed, as should also the danger of working in the same room, eating at the same table, sleeping in the same bed, or using the same dishes. The official procedures and precautions which are given in a preceding section must be followed. The nurse should also, under the supervision of the physician, amplify the latter's instructions as to mode of life and diet, and help arrange for outdoor sleeping facilities, clothing, baths, etc. She should not make any change in the patient's diet, except upon the physician's advice and consent. If there is no physician in attendance and the nurse is taking entire charge of the case, she should appeal to the health officer in matters of a medical nature in which she feels she needs assistance. When giving instruction it is advisable to select some responsible member of the household and teach slowly and carefully, giving practical demonstrations. It is, of course, necessary that the nurse make certain that her teachings are being followed; she should make corrections and changes where and when necessary.

In order to allow for the proper carrying out of the essential precautions, the health officer is required to advise the physician as to what he has on hand in the way of sputum cups, paper napkins, disinfectants, etc., and to provide the latter with a requisition form, which when properly filled out, must be honored by the health officer and the supplies requested furnished in the amount deemed necessary.

Medical emergencies or incidents which may arise in the course of the nurse's visits to the home include the occurrence of hemorrhage, pneumothorax, possibly confinement of the patient, or the occurrence of communicable diseases other than tuberculosis in the household.

In the case of *hemorrhage* the nurse should remember that in many instances the bleeding will stop without or in spite of any treatment which may be instituted. If the hemorrhage be due to

the erosion of a large artery in a cavity or into a bronchus the patient may bleed to death. The nurse should reassure the patient, both by words and actions, acting calmly, quietly and confidently. A physician should be notified, the patient put to bed in a semi-sitting position, with sufficient support by means of pillows under his back and head to maintain this position, and admonished to remain absolutely quiet and not even talk unless essential. Cracked ice may be given by mouth continuously and cold in the form of an ice bag applied to the chest (heart). The nurse should not leave the patient until the physician arrives.

Spontaneous pneumothorax in tuberculous patients is due to the giving way of the pleura and the entrance of air from the lungs into the pleural cavity. If this occurs suddenly, the patient will complain of severe pain in the chest with a sensation of something having given way and will show evidences of shock with a rapid, feeble pulse, hurried and labored breathing, great shortness of breath, a sense of suffocation, and a clammy skin which may be pale or bluish. The nurse should call a physician at once. The patient's position varies, it sometimes being impossible for him to lie down owing to the sense of suffocation experienced. When the condition comes on more gradually the symptoms are not so sudden, severe and pronounced Those cases which recover usually have the pleural cavity infected with pus forming organisms.

When a *communicable disease other than tuberculosis* occurs in the family, the medical disposition of the case will depend upon the physician in charge, the health officer, or the nurse if she is authorized to act. Wherever possible such patient should be promptly removed to a hospital. The Sanitary Code (Chapter II) makes specific provision for either the isolation or removal of cases of certain communicable diseases. In the case of diphtheria, scarlet fever or typhoid fever occurring in a hotel, lodging or boarding house, the health officer having jurisdiction is required either to have the patient removed to a suitable hospital, if available, or else to isolate the case on the premises if this can be done safely, the other inmates to be removed from the premises if necessary. When required, the municipal authorities must make provision for the medical and nursing care of such cases remaining

on the premises mentioned. In those localities where either a private or public agency employs visiting nurses for the specific purpose of attending cases of infectious or communicable diseases, it will usually be advisable for the tuberculosis nurse to withdraw temporarily from the family and permit the communicable disease nurse to take charge of both the tuberculous and other cases.

Maternity Cases in Family

When the patient or some other member of the family is to be confined, the disposition of the case rests with the physician, and if there is none, with the nurse in charge. It is advisable that the patient be removed to a maternity or other hospital. The tuberculosis nurse should not be expected to attend the patient during confinement; a physician, midwife, or visiting nurse from a public or private agency should be secured if possible.

Dental Service

Dental service is essential but may often be difficult to obtain, either because the dentist refuses to handle infectious cases, or can not or will not give free service to the indigent, or both. In order to overcome the first objection it is advisable to obtain a certificate from the health officer as to the patient's being non-infectious, i. e., not expectorating tubercle bacilli. A dentist willing to give his services free should be found; if this be impossible, efforts should be made to obtain funds from some charitable individual or agency. It may be necessary to send the infectious patient to another locality to obtain the required service.

The Family in an Insanitary House

For the family in an insanitary house one of two procedures is possible. The nurse may either attempt to have the conditions corrected, or failing in this she may take steps to bring about the removal of the family to a better home. For the first purpose, she should make complaint in writing directly, if so authorized, or else through her superior, to the department or bureau having jurisdiction. When removal is deemed necessary, if the family is being assisted or maintained by a charitable agency, recommendations to and cooperation with the latter should be

made and given. The consent of the health officer is not required for such removal; it must, however, be reported to him within 24 hours of its occurrence so as to allow for the necessary cleansing, renovation, or disinfection. In case a representative of a charitable agency desires to remove a family which is under the supervision of a nurse, the rules of the agency will govern; but it is best that the charity agent consult with the nurse or health officer, who may be able to advise as to the desirability of the new premises. The reporting of the removal to the health officer is required of the agent who should also inform the nurse so as to save her a trip to the wrong address.

Relief

As is generally known, tuberculosis is in many cases complicated by poverty. This is unfortunate, not only because of its unfavorable influence in connection with the development of active disease, but also in that it may, unless relieved, militate against the patient's receiving proper care and treatment. When the breadwinner of the family is affected, whether he go to the hospital or remain at home, the difficulties are obvious. In any case, the securing of the proper appurtenances, such as cure chairs, blankets, proper clothing, medicines, and food, presents a problem. Assistance rendered without cost either to remedy or alleviate social or physical defects is denominated *relief*. This may be *medical,* consisting of free medical, hospital or dispensary care, or *material,* including shelter, food or clothing. It may be secured through residence in an institution, when it is named *indoor* relief. *Outdoor* relief is that provided outside of a hospital. The sources from which assistance may be obtained are either public or private and vary from a single individual to an organization or institution. Which of these are available in a given community usually depends on its size, resources and enlightenment. It is not intended to go into details here regarding the securing and administering of relief. In order to be effective relief must be adequate, i. e., sufficient both in kind and amount. It should also be timely and administered so as to assist the recipient without pauperizing him or making him a helpless dependent, which he might otherwise not become. A good knowledge of the principles governing

charitable work, combined with good judgment, are essential; the public health nurse may have the latter, but not necessarily the former. For this reason, and also because it is more advantageous for all concerned, the nurse should not administer relief if there is any existing agency which can do so. If the latter does not function satisfactorily, the nurse should make efforts to discover the reason rather than to administer relief herself. Even when private individuals provide relief it may be possible to have them attend to the details of its administration. The nurse should know the charitable organizations in the community and cooperate with them; and while not directing the relief work, she should make recommendations to those who are doing so. In an emergency promptness of action is essential. When a lack of food, fuel or clothes, is found, the central office or nearest agent of an organization should be communicated with immediately.

Very often in localities where there is no relief organization, one may be initiated and established as the result of the nurse's request for aid from different private individuals.

SOCIAL WORK OF THE NURSE

When a social worker is not available it becomes necessary for the public health nurse to perform duties of a social character, which may go so far as to involve a complete readjustment of family conditions. Certain forms of social work, e. g., mothers' meetings, special classes for selected cases and clubs for boys and girls are really legitimate preventive activities.

COOPERATION AND DIVISION OF DUTIES BETWEEN THE SEVERAL WORKERS IN A TUBERCULOUS FAMILY

From what has been said it is evident that there may be one or more of a number of individuals visiting a tuberculous family for purposes concerned with the presence of the disease. In order that the interests of the individual and his family and those of the community at large may best be served, it is essential that the scope of duties of each of these be clearly defined. This matter has been previously indicated, what follows is supplemental.

The provisions of the code of medical ethics, which prescribe a standard of conduct for physicians in their relation with one another and with the public, must be carried out insofar as they are applicable. The nurse visiting a case attended by a physician, is essentially the latter's assistant; if the nurse is employed by the State or a municipality she also usually represents the health officer or other authority under whose direction she acts. Where a district or poor physician attends a case, his relation to the patient is the same as that of a paid private physician, and he is entitled to the same courtesies. Sometimes technical and other considerations modify the situation. For instance, the physician may be required to make only one visit or to attend the patient for a specified time or to attend only such patients as consult him upon the written order of a public authority during the period specified by such authority. These details may affect the relations of the nurse or social worker visiting the family to such district physician; if deemed advisable, they may refer such patients to other physicians, or to dispensaries, either with his consent, or when his period of attendance expires. In some communities the system which provides medical attention to the poor does not always operate satisfactorily, and the nurse may be justified in acting upon her own initiative. It is well for the nurse to be informed as to the precedures necessary to secure the services of a charity physician so that in an emergency there may be no misunderstanding or technical evasion by anyone concerned. As an illustration of the differences in procedures, it may be stated that in some localities the physicians may not be required to respond to an emergency call except upon a police order. In other districts it may be necessary for the patient himself or a member of his family to make application in person for medical service.

Many poor patients are not actually seen by any medical worker except the nurse, although, nominally at least, there should be a physician in attendance. If there is none, or if he permits the nurse to act for him, then all sanitary and medical problems in the family come definitely within her province. If a responsible charitable agency is interested all economic matters in the family

are quite as definitely within its province. When, on the other hand, there is a physician and lay social worker but no nurse attending, the medical direction and disposition of the patient rests entirely with the physician, unless the health officer has cause for interference, in which instance the latter can have the case visited by a nurse; such procedure is often necessary and is justified if the physician is only nominally in attendance or does not maintain sanitary oversight. Should the necessary cooperation between the social worker and the nurse visiting a tuberculous family become impossible, or should the withdrawal of either become advisable, it is the nurse who should continue to visit the family. She can not discontinue her visits, if she is acting under the direction of a public health authority, without consent of such authority. The health officer has the right to cause any reported case of tuberculosis under his jurisdiction to be visited by a public health nurse, under which circumstances the latter acts as the health officer's representative in the enforcement of the law, and the continuance of her activities is essential.

In those cases where several different agencies employ nurses for field work it is often necessary to exercise care in order to prevent duplication of effort. The public health nurse acting under the direction of local or state health authorities has certain legal duties to perform, as previously indicated; these she can neither delegate to others nor neglect. Where it is necessary for nurses representing other agencies, such as hospitals, dispensaries and tuberculosis committees, to visit families in charge of a nurse representing a health authority, the ordinary rules of courtesy should be observed. The nurse primarily in charge of the family should be consulted first; she may be able to accomplish the work or obtain the information desired, in which case no visitation by others will be necessary. Where it is desirable that the nurse from the private or other agency keep the patient or family under observation or visit them frequently, a plan of cooperation should be agreed upon by all concerned. It may be feasible, for instance, for the nurse representing the health authority to make the first visit, provide the first instruction, etc., and

make only occasional subsequent visits, while the other agencies concerned are closely in touch with the family's affairs. Harmonious cooperation is absolutely essential.

Other Forms of Tuberculosis

The public health nurse usually visits only pulmonary and laryngeal cases of the disease; other forms, such as bone, meningeal, kidney and peritoneal tuberculosis, are not usually communicable and sanitary supervision may not be necessary. It may be sufficient for the nurse to call occasionally on such families to determine that no other members have suspicious symptoms or are affected with the disease. The number of cases of nonpulmonary forms of the disease is so large that it is not practicable for the public health nurse to follow them up or, in many localities, even to make any visitation of them. Such patients should be removed to institutions or be taken care of by a visiting nurse from a private agency or settlement house, or community center. In large cities cases of bone and other surgical tuberculosis may be visited by surgical nurses from private agencies.

Right of Entrance and Inspection

Regulation 15 of chapter II of the Sanitary Code provides that no person shall interfere with or obstruct the entrance to any house or building by any inspector or officer of the state or local health authorities in the discharge of his official duties, nor shall any person interfere with, or obstruct the inspection or examination of any occupant or any such house or building by any inspector, or officer of the state or local health department in the discharge of his official duties. It is, therefore, obvious that the public health nurse, in acting for or under the direction of a local or state health authority, has the right to enter premises and visit occupants when necessary to do so in the performance of her duties. In some communities it has been found practicable for the health officers to delegate their authority to nurses employed by private agencies so as to facilitate their work.

Milk and Eggs for Tuberculous Patients

When the nurse has milk and eggs available for distribution to her patients she should, in justice to all concerned, pursue a

definite policy in her distribution of such food. Milk and eggs are very apt to be misused unless the nurse exercises care and discrimination. It may be very useful for her to observe the following rules:

1 The patient and family must be unable to buy them.

2 The patient must thoroughly cooperate with the nurse and observe her instructions — and when the patient fails to do so the furnishing of milk and eggs should be discontinued.

3 No incipient patient should be given milk and eggs unless there is sufficiently good reasons why he can not go to a sanatorium.

4 No patient should be given more than one quart of milk daily and one dozen eggs weekly except for special reasons.

5 Milk and eggs should never be given as relief or as supplementary relief.

6 No distinction should usually be made between classes of patients with regard to their supervision by private physicians, dispensaries, tuberculosis classes and health officers if the supervising agency approves the patient's application for milk and eggs; hospital patients, however, should not be eligible.

7 As soon as the patient or family is able to buy milk and eggs the free supply should be stopped and they should be advised of the fact.

8 Application for milk and eggs should be made in writing by the patient or head of the family, and it should be agreed that they will be used only as directed by the physician.

9 Milk and eggs should not be given to any patient who is not under the supervision of a public health nurse who has agreed to assist in the enforcement of these rules.

10 In supplying milk and eggs patients should be given preference as follows:

(a) Tuberculous children under 16 years of age;
(b) Advanced patients who can not assimilate other food;
(c) Incipient patients;
(d) All other tuberculous patients.

ORGANIZING A LOCAL TUBERCULOSIS CAMPAIGN

It may be that the nurse will find that little or no antituberculosis work has been done in certain communities and it is then her

proper function to stimulate such work. It is usually advisable that different individuals and agencies, such as physicians, health authorities, business men, women's clubs, clergymen and the press be interested, the last two being able to speak on the subject from the pulpit and through the newspapers, respectively. A tuberculosis exhibit should be given and a tuberculosis society formed. A dispensary should be established with a well qualified physician and nurse attached to it; if advisable and feasible, a camp should be started. Though in the beginning it may be necessary to obtain private funds for these purposes, it is usually not difficult to have the municipality later supply the fund and take charge of the activities.

Records

Records are of secondary importance; they are necessary, however, for obvious reasons. They should be simple and at the same time sufficiently complete. The State Department of Health, and the State Charities Aid Association Tuberculosis Committee, in cooperation, have prepared a set of records intended for the use of county tuberculosis nurses, but adaptable with slight modifications for other nurses engaged in tuberculosis work. Complete sets of these may be purchased from the latter organization.

CHAPTER IX

Cooperation of Health and Educational Authorities in the Control of Communicable Diseases

School medical inspection has two definite aims; first, the early recognition and exclusion from school of children suffering from acute communicable disease, as a prime factor in the control of local epidemics; second, the recognition of physical and mental defects and abnormalities and chronic disease among the pupils, followed by the institution of remedial measures.

COOPERATION IN SCHOOL MEDICAL INSPECTION

Since the enactment of the amended Public Health Law in 1913, and of the amendments to the Education Law relating to the physical welfare of school children in the same year, there has arisen from time to time an apparent conflict of authority. So many questions have come up as to the respective duties of the health officer and the school medical inspector that it was thought advisable to define as closely as possible the duties of each office and to point out the methods to be used in following up children absent from school presumably on account of communicable disease.

It should be remembered that the Education Law was enacted subsequent to the amendments of the Public Health Law, and by implication amends and takes the place of paragraph 2 of section 21-b of the Public Health Law. This law provides that a school medical inspector shall be appointed for each district to examine all children who have not had health certificates issued after examination by their family physician. Section 575 of the Education Law * provides that pupils, who upon investigation show

* *Section 575 of the Education Law:* "Whenever upon investigation a pupil in the public schools shows symptoms of smallpox, scarlet fever, measles, chickenpox, tuberculosis, diphtheria, influenza, tonsilitis, whooping cough, mumps, scabies or trachoma, he shall be excluded from the school and sent to his home immediately, in a safe and proper conveyance, and the health officer of the city or town shall be immediately notified of the existence of such disease. The medical inspector shall examine each pupil returning to a school without a certificate from the health officer of the city or town, or the family physician, after absence on account of illness or from unknown cause. Such medical inspector may make such examinations of teachers, janitors and school buildings as in their opinion the health of the pupils and teachers may require." (Added by L. 1913, ch. 627, in effect August 1, 1913.)

symptoms of certain communicable diseases, shall be excluded from school and that the health officer shall be notified.

Exclusion From School

Children shall be excluded from school according to the Public Health Law and the Sanitary Code, when they are presumably affected with a communicable disease. Teachers throughout the State may obtain from the State Department of Health a pamphlet entitled, "Cooperation in the Control of Communicable Diseases Among School Children" which will be of great value to them in reporting children who should be excluded from school. Children may be excluded by the principal or by the school medical inspector or the health officer. When a child is excluded from school for one of the diseases enumerated in either Sanitary Code or Section 575 of the Education Law, the child should be given a card by the principal or teacher notifying the parents that the child was sent home affected with symptoms suggestive of communicable disease and the local health officer must at once be notified. In order to return to school, the child (in accordance with Section 575 of the Education Law) must have a card signed either by the health officer or school medical inspector, or if by the family physician, countersigned by either one of these officials (Regulation 26 of Chapter II of the Sanitary Code). School authorities should remember that unless such cards (supplied by the State Department of Education) are provided, and unless the child or its parents are advised as to the conditions on which the child may return to school, the latter may lose much school time, or the parents may permit the child to return to school while still able to transmit infection.

Outbreaks of Communicable Diseases

Communicable diseases in the school can not be controlled without efficient work and hearty cooperation on the part of the local health and school officials, the family physician and parents. The school medical inspector is required by law to notify the health officer of every case of communicable disease which occurs in a school child. Conversely, the health officer should report to

the school medical inspector every case of communicable disease which occurs in a family in which there are children of school age. What is perhaps more important is the visiting of families in which children are absent from school. Frequently the absence is on account of one of the milder communicable diseases, and no physician is in attendance and therefore the disease has not been reported to the health officer. For this reason there is no medical or sanitary supervision of the case. School authorities will find it of extreme value to have a school nurse or attendance officer follow up absentees from school, and in this way will frequently discover cases of communicable disease. Whenever the school nurse or attendance officer discovers a child ill with a disease which may be communicable it is their duty to report promptly all the facts to the local health officer. It is not the health officer's duty to visit all cases of sickness unless there are sufficiently good reasons to believe that the case may be one of communicable disease.

It will be found of great advantage to the school nurse or attendance officer to keep a small notebook to record the name, age and address of any child who may be absent from school on account of communicable disease, and the names of other members of the family attending school. The school medical inspector should also keep a record of communicable disease diagnosed by him and reported to the local health authorities.

On the other hand, the health officer should not only investigate and visit or cause to be visited every household where a case of communicable disease is reported or suspected to be present, but also should make a list of the names of all the persons who live in the house and this list should be kept and the house revisited from time to time in order to ascertain whether or not quarantine is being observed in the infected household or whether any of the contacts have "come down" with the disease. If communicable disease exists in epidemic form in any community, it is generally wiser not to close the school but to keep the various classes under daily supervision and to exclude promptly persons suspected of developing the disease. It will usually be found preferable to exclude a certain class or classes from school rather than to close

the entire school. Whenever an outbreak occurs, it is recommended that the school medical inspector make daily visits to the school if daily inspection is not made and inspect all the children, and the health officer will be expected to cooperate with him and render all assistance possible, but it is believed that it is the primary duty of the school inspector assisted by the school nurse, if one is employed, to perform this service.

Before making examinations of children, whether for an ordinary physical examination or for the presence of a communicable disease, the usual aseptic precautions should be taken. For examining the throat an ample supply of wooden tongue depressors should be provided, also facilities for disinfecting thermometers. Physicians and nurses should use extreme care that the hands are thoroughly washed before and after each examination of the nose and throat.

At the close of an epidemic terminal fumigation is not always necessary, but the school room or rooms where cases of communicable disease have been detected should be scrubbed with soap and hot water and then given a thorough airing. During the existence of an epidemic it is of great advantage to have warnings issued in the press and also in the form of bulletins in which reference is made to the fact that the Public Health Law requires heads of families to report to the health officer suspected cases of communicable disease coming to their notice if no physician is in attendance (Reg. 5, Chapter II Sanitary Code.)

The New York State Education Law provides for the medical inspection of all pupils attending the public schools in the State. It states that medical inspection shall not only include the examination of school children for physical defects but shall also provide for the exclusion from school of all pupils who show symptoms of smallpox, scarlet fever, measles, chickenpox, tuberculosis, diphtheria, influenza, tonsilitis, whooping cough, mumps, scabies or trachoma. Although the law is quite specific on many points, it does not, in this section, definitely state how these diagnoses shall be made or how pupils shall be excluded from school. It does provide, however, that upon returning to school after

absence on account of illness from unknown cause, each pupil shall be examined by the medical inspector unless he has a certificate from the health officer of the city or town, or from the family physician, and regulation 26 of chapter II of the Sanitary Code, already quoted, furthermore requires that if such certificate is signed by the attending physician it should be countersigned by the health officer or school medical inspector. The communicable diseases mentioned in the law occur more frequently among children of school age than in any other age group, and every effort should be made to prevent the spread of communicable disease among such children.

The law further provides that the Commissioner of Education may adopt rules and regulations, not inconsistent with the provisions of the section of the law, for the purpose of carrying into full force and effect the objects of the law.

There is no question but that teachers * should be taught the beginning symptoms of communicable diseases, that children should be excluded from school who have evidence of such diseases, and that such children should not be allowed to return to school except on certificate of the physician countersigned by either the school medical inspector or the health officer.

JUVENILE HEALTH OFFICERS FOR SCHOOL ROOMS

The appointment of a "Juvenile Health Officer" in each school room — appointments to be made by the teacher at intervals and appointees to include both boys and girls — will stimulate interest, have an educational influence, and may furnish the teacher, nurse, or medical inspector with valuable information. The Juvenile Health Officer should be deputized to submit to the teacher any information in regard to children out of school on account of illness who may be suffering from a communicable

* The State Department of Education is developing a system through which this instruction will be given to teachers.

disease. A convenient form for such a report, shown below, will be popular with the juvenile official.

JUVENILE HEALTH OFFICER'S REPORT

DIST. NO..... GRADE.....

WEEK ENDING.....19.....

ABSENTEES

Are all contagious diseases quarantined?.....

Give names of sick pupils on back of blank

	DAY OF WEEK					
	M	T	W	T	F	
Number of pupils enrolled.....						
Number absent because of illness.....						
Number absent because of typhoid fever.....						
diphtheria.....						
smallpox.....						
chickenpox.....						
scarlet fever (scarlatina).....						
whooping cough.....						
mumps.....						
measles.....						
pinkeye.....						
Other diseases (write names of disease).....						
.....						
Other absentees (cause of absence given).....						
.....						

Juvenile Health Officer.

In order properly to control outbreaks of communicable diseases, and in order to prevent the occurrence of cases of such diseases in the public schools, a series of regulations have been drawn up by the State Commissioners of Health and of Education, in accordance with the provisions of the Educational Law, definitely defining the duties of the school medical inspector, principal, teacher, and local health officer, as follows:

RULES AND REGULATIONS FOR HEALTH OFFICERS AND SCHOOL MEDICAL INSPECTORS FOR THE CONTROL OF COMMUNICABLE DISEASE

1 Whenever a school teacher, a school medical inspector, school nurse, or attendance officer discovers that any school child absent from school is affected with any disease presumably communicable, he or she shall report forthwith to the local health officer all

known facts relating to the illness of the child, together with the name, age, address, school attended and grade of such child and the name of the physician, if any, in attendance.

2 When no physician is in attendance, it shall be the duty of the local health officer to investigate the nature of the illness of every person within his jurisdiction reported to him as affected with a disease presumably communicable.

3 Whenever a case of communicable disease occurs in any school, it shall be the duty of the school medical inspector to notify the health officer of such case immediately and to ask his cooperation and assistance in controlling the disease in said school.

4 Whenever a case of communicable disease occurs in any school in his jurisdiction it shall be the duty of the health officer to render every assistance possible to the school medical inspector in the control of said disease.

5 Whenever a case of communicable disease occurs in any school, and there is no school medical inspector directly responsible for the prevention and control of communicable disease in said school, it shall be the duty of the local health officer to take all steps necessary to prevent the spread of the disease.

6 Whenever a child in attendance at school is reported to the school medical inspector by the school nurse or teacher as being affected with a disease presumably communicable, it shall be the duty of the school medical inspector to examine the child promptly, and if such child is affected with a communicable disease the school medical inspector shall report immediately to the local health officer all the facts relating to the illness, together with the name and address of such child.

7 Whenever a case of communicable disease in a family with a child or children of school age is reported to the local health officer, it shall be the duty of the local health officer to notify the school medical inspector promptly of the name, age, school attended, grade and address of such child or children and the nature of the communicable disease, and also of the names, ages, schools attended and grades of all other children in the same household.

If these rules and regulations could be fully understood and put in force by the local authorities, a very long step would be taken in the control of communicable diseases in schools.

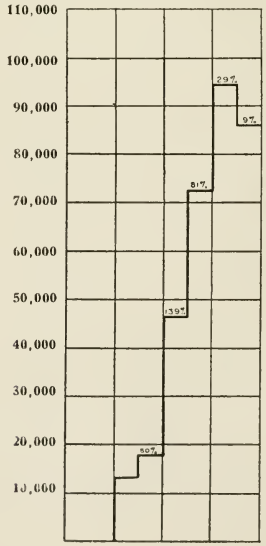
In far too many of our smaller cities and in our villages and towns, there is a desire on the part of the school trustees to close a school whenever there is an outbreak of a communicable disease. The Education Law does not cover this situation and the trustees undoubtedly have the authority to take this action. Here is where tact and cooperation are necessary, for the school trustees may in their right do as they choose, but if properly approached, and if the situation is properly presented to them, they will do the wise thing and provide for the proper following up of each absentee from school, and see that the cases are controlled outside of the schools, and that cases of suspected illness are excluded promptly.

CHAPTER X

The Public Health Laboratory

The public health laboratory is an institution the initiation and development of which has occurred within the memory of some of the readers of this manual, but it is to-day generally regarded as a most important and essential feature of public health work. The following diagram, showing the number of diagnostic specimens (in diphtheria, tuberculosis, typhoid, syphilis, and other diseases) examined in the New York State Laboratory annually since 1913, indicates graphically the extent of increase in demand for this branch of laboratory service.

TOTAL NUMBER OF DIAGNOSTIC EXAMINATIONS OF DIPHTHERIA, TUBERCULOSIS, TYPHOID FEVER, SYPHILIS AND OTHER DISEASES



The New York State Laboratory, located at Albany, is in charge of the Director of the Division of Laboratories and Research of the State Department of Health. Generally speaking, its most important functions are the examination of diagnostic specimens from cases of communicable disease; the analysis of samples of water from public water supplies; the preparation and distribution of antitoxins, serums, vaccines and chemical preparations used for the prevention and treatment of communicable disease, as well as culture media and outfits for the collection of specimens for examination; and research directed toward improvement of old and the development of new methods of procedure for the prevention and treatment of disease.

Because in many instances prompt reporting upon examination of diagnostic specimens is of great importance and transportation of such specimens necessarily consumes time and involves other difficulties, many counties and other municipalities have established local laboratories in which such specimens are examined. Bacteriological tests upon milk samples, the nature of which makes transportation for considerable distances impracticable, are usually also made at local laboratories.

It is not essential that the public health nurse be intimately acquainted with the details of laboratory procedures. She should, however, be familiar with the functions of the laboratory and she should know what specimens will be accepted for examination and under what conditions, and how to prepare them.

In most instances when preparing laboratory specimens she will be working under the supervision of a health officer or other physician, who will also assume responsibility for interpreting reports; but it will often prove a decided advantage if the nurse has sufficient general knowledge to enable her also to interpret laboratory reports intelligently. In the following chapter those diseases in which laboratory examinations are of such value that physicians require them constantly are briefly discussed and the purposes of such examinations are explained.

CHAPTER XI

Laboratory Service

General Considerations

Laboratory supplies furnished by the State, including antitoxins and other products for prevention and treatment, and diphtheria culture tubes and outfits for collecting laboratory specimens, are distributed through local supply stations maintained either by health officers or under their supervision. Physicians and nurses secure their supplies from such stations, except where they are issued through local laboratories.

Health officers receiving supplies for distribution obligate themselves to keep them under proper conditions, to exchange those which are perishable as often as necessary, and to make them easily accessible to those having occasion to use them.

Packages containing antitoxins and other perishable products for immunization or treatment have noted upon them the dates of preparation or testing. The time after which the product should not be used is recorded either on the label or on the circular enclosed in each package. The packages should be kept constantly in a cold dark place, preferably in an ice chest. If kept under such conditions, they will retain their strength for the periods indicated by the expiration dates. Diphtheria culture tubes contain " slants " of grayish white culture medium (coagulated blood serum), which should present a smooth, moist surface. Products of expired date or culture tubes containing media which has dried and separated from the sides of the tubes should never be accepted for use.

Health officers are supplied with containers for various specimens to be transmitted to the laboratory, including material for cultures, specimens of blood, fecal and urinary discharges, sputum, pus, etc. These are so equipped for mailing as to comply with postal regulations and should invariably be used in accordance with directions accompanying them.

Accompanying each specimen " outfit," is a blank information form to be filled out and returned with the specimen. Informa-

tion asked for is either required by law or for the guidance of laboratory workers in making examinations of specimens and interpreting results, and should always be given as fully as possible. The public health nurse will frequently have occasion either to prepare specimens for mailing or to fill out information blanks for specimens prepared by the health officer or attending physician. She should bear in mind the fact that failure to furnish information asked for may not only cause serious inconvenience, but may also be responsible for delay in the return of a report. In view of the very large number of specimens examined daily in the State Laboratory the work necessarily becomes routine; if complete data is submitted with specimens, attention will be called in special instances to the advisability of devoting more than the ordinary amount of time to the examination of a specimen or of submitting it to special tests.

Communicable Diseases

Diphtheria. Infectious agent; the diphtheria bacillus (sometimes called "Klebs-Loeffler" bacillus). In typical cases a grayish white false membrane forms in the throat, nose, or larynx.

Except in the most typical cases, positive diagnosis of diphtheria is difficult or impossible without resort to laboratory aids. False membrane may be present in Vincent's angina, septic sore throat and other conditions, as well as in diphtheria. On the other hand in many cases of true diphtheria from which virulent diphtheria bacilli may be conveyed to others no membrane can be seen. Such cases, simulating tonsilitis or ordinary sore throat, are especially dangerous because likely to be overlooked. They can be diagnosed only by discovering the presence of the diphtheria bacilli. For this reason the State Sanitary Code provides that every physician attending a case in which there is reason to suspect the existence of diphtheria shall take a culture, and submit it to an approved laboratory for examination.

The Sanitary Code also requires that cases of diphtheria, before being released from quarantine, shall have two successive cultures from the nose and throat, taken not less than 24 hours apart, neither of which shall show the presence of diphtheria bacilli, the first culture to be taken not less than 9 days from the date of onset

of the disease. This rule does not constitute an absolute safeguard, since some who are released even after two successive negative cultures, still harbor a few diphtheria bacilli, usually for a short time. It is one very generally adopted, however, and experience has demonstrated that, as a practical measure, its efficient application produces satisfactory results.

In nearly all of the larger communities cultures for release of diphtheria cases are now taken by the health officer or his official representative. This is desirable, both from the standpoint of the Health Department and the attending physician. The public health nurse is most likely to be the "official representative" to whom the duty of taking material for release cultures will be assigned. She may also be called upon to take material for cultures from suspected cases. She should, therefore, be familiar with the procedure, (see Laboratory Manual) and acquire proficiency by practice.

It is sometimes possible to make a laboratory diagnosis of diphtheria by examination of a "smear" made directly from the swab used in taking material for culture. Such a "smear" is prepared by rubbing the swab (after swabbing the throat) over the surface of a glass microscopical slide (miscellaneous outfit in lilac envelope) until it is apparent that some of the material from the throat has been transferred to the slide, after which specimens should be allowed to dry preparatory to fixing by heat and staining. Laboratory practice, however, requires that this preliminary diagnosis be confirmed by examination of material from a culture. This is especially important when examination of the smear has failed to reveal the presence of diphtheria bacilli.

If Vincent's angina is suspected a smear should be submitted. It is necessary, however, to use the swab more vigorously and with more pressure than in securing material for cultures. When special examinations or tests are required, this should be clearly indicated upon the information blanks accompanying the specimens.

It is now well known that there is only one effective method of treatment for cases of diphtheria and that this is specific — the administration of diphtheria antitoxin. When the toxin formed by diphtheria bacilli gets into the circulation, it enters into

chemical combination with body tissue, thereby injuring or destroying tissue cells. The ultimate result of injury to nerve tissues, which are especially susceptible to the effect of the toxin, is sometimes a so-called "post-diphtheritic" paralysis or even sudden death. Diphtheria antitoxin readily combines with free toxin and so prevents it from combining with body tissues. If the toxin has already entered into combination with body tissue, antitoxin is no longer of value, except for its effect upon toxin subsequently formed. For this reason antitoxin becomes less effective with each day's delay in administration. When an early and liberal dose is given the antitoxin combines with any toxin already discharged from the bacilli and renders it harmless and surplus antitoxin circulates in the blood for several days, free to combine with toxin that may subsequently be formed. In such cases prompt recovery is likely to occur after a single adequate dose.

Antitoxin is also administered to persons who have been exposed to diphtheria and who are believed to be susceptible, for the purpose of producing immunity (a specific insusceptibility) to diphtheria infection. The immunity thus established is temporary, generally lasting from two to three weeks. This is usually adequate if the individual is immediately removed from further exposure.

Much more lasting immunity against diphtheria may be produced by administration of standard "toxin-antitoxin mixture." (See Laboratory Manual.) This procedure, however, may consume several weeks and is not adapted for use in emergencies.

Treatment with toxin-antitoxin mixture has been introduced too recently for it to be possible to know how long the immunity will last. There seems to be little doubt, however, that an active immunity persists for at least three years and probably for a considerably longer period, if not permanently. Injections of diphtheria antitoxin — which give protection for two or three weeks — must, therefore, always be used where exposure has occurred and immediate protection is necessary.

Many individuals possess a natural or acquired immunity to diphtheritic infection, and therefore do not require artificial immunization. By the "Schick test" one can determine whether or not immunity already exists. (See Laboratory Manual.) A

minute and definite quantity (0.1 c. c.) of a standard solution of diphtheria toxin is injected into the skin of the forearm. In persons who are susceptible a bright red reaction develops within 24 to 72 hours. This test is particularly adapted to use in institutions or where large numbers of persons are involved and should only be attempted by physicians familiar with its use. Diphtheria toxin is one of the most powerful poisons known. Serious and even fatal results may follow its use in connection with the Schick test in inexperienced hands.

Persons who have recovered from diphtheria may continue to carry diphtheria bacilli in their throats or noses for varying lengths of time. Again, those who are themselves immune may acquire and harbor the organisms, being a source of danger to others, though they themselves do not become ill. Such individuals are known as diphtheria "carriers." The public health nurse may be called upon to take material for cultures for the detection or release of such carriers, who are subject to special rules and regulations. (See Manual on The Prevention and Control of Communicable Diseases, page 136.)

The nurse who regularly comes in contact with diphtheria cases or carriers should not overlook the possibility that she may acquire the disease, or become a carrier, and thus unwittingly convey the infectious agent to others—especially to children. If there is doubt as to her immunity the question should be settled by means of a "Schick test." If she is found to be susceptible, much more lasting and possibly permanent immunity may be produced through the administration of toxin-antitoxin mixture. Before leaving a case she should invariably wash her hands thoroughly with soap and water. Every reasonable precaution should be observed to avoid contact with or transference of infected secretions.

Tuberculosis. Infectious agent: the tubercle bacillus. One of the duties of the public health nurse may be to collect specimens of sputum from cases of suspected pulmonary tuberculosis. (For directions see Laboratory Manual.) Tubercle bacilli are usually present in the sputum in cases in which there is a broken-down tuberculous lesion discharging into the air passages. A minute lesion may discharge bacilli for a time and ultimately heal. When

tubercle bacilli are found regularly and in large numbers, it indicates that the disease has passed the incipient stage.

Failure to find tubercle bacilli in one or more specimens of sputum does not indicate that the patient is not suffering from tuberculosis. There may at the time be no discharging lesion or the various specimens may not have included material from the infected portion of the lung. Furthermore, when only a few organisms are present, they may be overlooked, even after prolonged search. In suspected cases, when negative reports are received, further specimens should always be submitted for examination.

Typhoid fever. Infectious agent; the typhoid bacillus. After about the second week of illness in a case of typhoid fever the bacilli usually begin to appear in the intestinal discharges and frequently in the urine. As a rule the organisms disappear within a short time after recovery from the disease. When they persist, as they sometimes do, the individual is regarded as a typhoid "carrier." The typhoid carrier, unless discovered and kept under observation, may be a greater source of danger than a person ill with the disease, since the activities of the latter are limited as a result of his illness.

Carriers are detected through laboratory examinations of specimens of fecal and urinary discharges. When discovered they are subject to special rules and regulations. (See Manual on The Prevention and Control of Communicable Diseases, page 140.)

Except in typical cases, the diagnosis of cases of typhoid fever is difficult or impossible without resort to laboratory tests. The simplest of these is the "agglutination" test (Widal), made with specimens of blood from the suspected cases. (See Laboratory Manual.) After about the tenth day of the illness, the blood serum (the clear fluid which separates from the blood in the process of clotting) of a typhoid case, when mixed in proper dilution with typhoid bacilli grown upon culture medium in the laboratory, will cause the bacilli to form in clumps or "agglutinate." The Sanitary Code requires every physician attending a case of illness in which there is reason to suspect typhoid (or paratyphoid) fever, to take blood specimens to be submitted for examination by an approved laboratory.

Immunity against typhoid fever may be established for a varying period of from one to four or more years, by the administration of typhoid vaccine, consisting of dead typhoid bacilli. (See Laboratory Manual.)

Paratyphoid fever. Infectious agent; the paratyphoid bacillus, closely related to the typhoid bacillus. The disease frequently resembles typhoid fever, but is of shorter duration. Blood from a paratyphoid case usually agglutinates paratyphoid bacilli, by which the diagnosis may be determined. The agglutination test is less reliable than that in typhoid fever. Paratyphoid bacilli may sometimes be demonstrated in fecal specimens, while the agglutination reaction is still absent. When there is a question as to whether a case is one of typhoid or paratyphoid fever, both typhoid and paratyphoid tests will be made on the same blood or fecal specimen upon request.

Immunity is established by administration of vaccine containing dead paratyphoid bacilli. It is customary to immunize at the same time against typhoid and paratyphoid by use of mixed vaccines.

Dysentery. There are two varieties of dysentery, a disease of the intestinal tract; one incited by a microorganism known as the *amœba coli,* and prevailing chiefly in tropical and subtropical countries, the other, not uncommon in New York State, incited by the dysentery bacillus.

The diagnosis of bacillary dysentery may be determined or confirmed by a blood agglutination test similar to that used to diagnose typhoid fever or by demonstration of the bacilli in fecal specimens. The latter, in this disease, is the more practical and reliable method.

Persons who have recovered from dysentery may continue to discharge the infectious agent, as in typhoid fever, and unless the carrier condition is discovered may convey the infective agent to others.

Tetanus (*" lock-jaw "*). Infectious agent; the tetanus bacillus. The bacillus is frequently present in road dirt and garden soil containing stable manure and grows readily in deep wounds from which air is excluded. Penetrating wounds and those which are badly lacerated and contaminated are most favorable for the development of tetanus. Tetanus antitoxin, administered at the

time of receiving such an injury, with appropriate surgical treatment of the wound, is usually effective as a preventive of tetanus.

Tetanus antitoxin is far less effective in the treatment of tetanus than in its prevention. Successful results, however, have followed the administration of large doses, even after symptoms of the disease have made their appearance. The toxin discharged by tetanus bacilli is a very powerful poison. It enters into chemical combination with body tissue even more readily than does diphtheria toxin and has a special affinity for the cells of the central nervous system (brain and spinal cord). Tetanus antitoxin combines with some of the free toxin and thus prevents it from combining with and injuring the tissue cells. Results are apt to be less successful than in the treatment of diphtheria with diphtheria antitoxin for two reasons: (1) By the time the first symptoms appear the disease is already well advanced and all that can be reasonably expected of the treatment is the prevention of absorption of further amounts of active toxin by the nervous system, and (2) owing to its method of transmission (along the axis cylinders of nerves) it is less easily reached by the antitoxin in the circulating fluids. The best results have followed injection of large doses of antitoxin intraspinally and intravenously (into the spinal canal by lumbar puncture and into a vein at the time of appearance of the first symptoms).

Pertussis (*"whooping cough"*). Infectious agent; probably the pertussis bacillus (although this has not been established beyond question); present in discharges from the nose and throat of cases. The laboratory prepares a vaccine, consisting of killed pertussis bacilli, which has been used both for prevention and treatment. While its value has not yet been satisfactorily established, severe reactions rarely follow its administration and a number of observers have reported satisfactory results from its use. (See Laboratory Manual.)

Malaria. Infectious agent; a plasmodium, present in the blood of infected persons. The plasmodium is transferred from one individual to another only by the bite of the female anopheles mosquito and its dissemination depends upon the presence of this mosquito. Diagnosis is made or confirmed by finding the plasmodium in blood specimens. (See Laboratory Manual.) On

account of the similarity of the symptoms of malaria and typhoid fever, a laboratory test of the blood of the patient should be made wherever there is a question of diagnosis.

Epidemic cerebrospinal meningitis. Infectious agent; the meningococcus. Other forms of meningitis are incited by other organisms or occur as a complication of other diseases. The diagnosis is often difficult or impossible without resort to laboratory aids. The common procedure is for the attending or consulting physician to make a lumbar (spinal) puncture, withdrawing spinal fluid, which is used for bacteriological examination and replaced by antimeningococcus serum if the fluid withdrawn is found to be cloudy. (See Laboratory Manual.)

The infective agent occurs in the discharges from the noses and throats of cases and carriers. The culturing of meningitis cases and carriers requires special apparatus and methods and is impracticable except in the hands of those familiar with the technique and when cultures can be taken directly to the laboratory.

Pneumonia. Infectious agent in common type of lobar and bronchopneumonia and often in the so-called "secondary" pneumonias (those developing in the course of or following other diseases); the pneumococcus. Bacteriologically four types of pneumococcus are recognized, these having been designated as Types I, II, III and IV. In order to determine the type of pneumococcus present in any case, it is necessary to have a specimen of sputum freshly delivered to a laboratory especially equipped for this work. (See Laboratory Manual.) The State laboratory supplies a serum for treatment of cases incited by Type I pneumococcus.

Syphilis. Infectious agent; a specific spirochaete (*Treponema pallidum*), present in the discharges from open lesions (sores) in active cases. Two laboratory procedures are of value as aids in the diagnosis of syphilis—the direct examination of fresh material for the detection of the spirochaete, and the test of blood for "complement-fixation" (Wassermann test). For the detection of the organism smears are prepared and examined while still fresh. Special apparatus is necessary and examinations can only be made at laboratories especially equipped for the purpose.

The complement-fixation test of samples of blood from cases of suspected syphilis is intricate and not easy to understand in detail. However, the public health nurse, a part of whose duty frequently involves the investigation of cases of venereal disease, should be able to interpret reports received on specimens examined. Here, as elsewhere, it should be borne in mind that a negative report on a specimen does not invariably indicate freedom from the disease. In many instances the examination of several specimens may be necessary before definite conclusions can be drawn. Besides being of value in diagnosis the blood test is also of use as indicating the results of treatment.

Gonorrhea. Infectious agent; the gonococcus, present in discharges from the genito urinary organs of infected persons. Specimens of discharge are obtained by making a thin smear upon a microscopical slide. (See Laboratory Manual.) The nurse, before undertaking the preparation of such specimens, should have personal instruction from a physician or other person familiar with the technique and with the precautions to be observed.

CHAPTER XII

The Nurse in Public Health Education

The fundamental idea of public health education is to secure community action on public health problems. Theoretically, one may suppose that if the more intelligent element of the community can be made to respond, the result, ultimately, will be "to leaven the whole loaf." Practically, however, public health education means reaching the whole community with statements of facts so clearly phrased, so convincingly presented and so obviously important that "he who runs may read," and individual opinion becomes public opinion.

The impetus in changing health practices may come from the crowded tenements instead of the more spacious home, as was witnessed in New York City when tenement house people found that antitoxin administered for diphtheria saved life, prevented others from getting the disease and shortened the period of quarantine. Such a demand for diphtheria antitoxin arose that all physicians who wished to retain their patients were obliged to administer the product wherever suspicion existed that the disease might be present. It has therefore become the practice of health authorities as guardians of community health to seek to carry the newest sanitary and hygienic knowledge to the individual home, and to present it in such fashion that it will attract the attention of the people most likely to be interested in the practical value of the information. For this reason desirable methods of disseminating health information are often likened to those employed in marketing oil heaters, automobiles, or other manufactured product.

ADVERTISING HEALTH

Methods Employed. First in importance among the older ways of reaching the general public with information on health conservation may be reckoned the newspaper, for by no other means can so large an audience be secured. Second to the newspaper is the printed circular or bulletin of special information.

These printed messages should be supplemented with lectures and public demonstrations of a character which will attract attention and create discussion. Motion pictures, lantern slides,

charts and panels for the wall which may be studied at leisure, and the bulletin board for health news are among the measures used for stimulating more personal interest in health subjects. The third measure is the most personal of all, that which deals directly with interested individuals. This calls for personal and family teaching and demonstration, and may be given at the clinic or in the home. It provides for trial and correction under supervision. Alone it reaches fewer people than the other two methods; in conjunction with the others it establishes permanent community health habits.

The Newspaper. Considering first, the newspaper as a means of reaching the public, it must be realized that while it is the most valuable agency, it is at the same time the most difficult to secure as an ally. The publishing of a newspaper is a highly specialized task. The aim of every good paper is to present the day's news in a concise and attractive form. The newspaper has neither time nor space for technical discussions — everything must be in a form to be quickly and easily assimilated by the average reader.

Under usual conditions the nurse should prepare news stories in advance. The average daily newspaper staff is pushed for time and reporters seldom can be spared to prepare articles from bare statistics or other data. The article must present either a new subject or a new angle of an old subject. It must be, above all, concise and to the point. The editor examines all copy in terms of "who, what, why, when and where." No one has the time to supply missing details except the writer.

It is manifestly impossible to lay down any set of rules or instructions which will result in a good news story. However, if a person writes a good letter, the chances are that the same person can write a good story. Perhaps the most important point to be kept in mind is that the good story has a "human angle". The big newspaper story is merely a development of the ordinary community item of gossip.

In preparing a story statistics should be given a wide berth. The "average reader" does not understand tabulations and few newspapers will print them. Statistics can be interpreted, however, for popular consumption, for they can always be arranged to show the

possibility of saving lives rather than presenting mere statements of lives lost.

In submitting an article to a newspaper, there are three rules which must be observed. These are:

1 Write on one side of the paper only, on a typewriter if possible, with double space between the lines.

2 Leave at least three inches blank at the top of the first sheet.

3 Submit copy to the "city editor" of the paper before 11 a. m. on the day of publication, if it is an afternoon paper, and before 8 p. m. on the day before publication, if it is a morning paper. Twenty-four hours' notice is better, if the lapse of time does not destroy the news value of the story.

There are some things which are desirable to get before the public which do not lend themselves to news stories. These may be embodied in a "Letter to the Editor" and thus will reach the public, although much effectiveness is lost. Such "letters" must be signed, but the name of the writer may be concealed under a *nom de plume* if this is advisable.

The use of "Letters to the Editor" are of value chiefly in arousing a community to discussion of a subject, especially when it is desired to get at all sides of a question regarding which there may arise some latent controversy. In a recent campaign for a tuberculosis hospital, for example, one highly original worker carried on a spirited debate with himself in the local newspapers. Under the *nom de plume* of "Veritas" and "Constant Reader," he argued the question pro and con for weeks. It is needless to say that the general public was not aware of the deception and that "Veritas" carried his point. The most significant result, however, was that dozens of people rose to defend "Veritas" when the "Constant Reader" letters were unjust and unfair. This scheme was justified, for it roused the community to action, the one result sought.

Another subterfuge resorted to occasionally when the local newspapers are not disposed to give space to certain facts which the worker wishes brought before the public is to secure the services of a prominent local citizen as a speaker. For example, in a recent tuberculosis hospital campaign, it was desired to secure publicity for a letter written by two young women patients at the

existing sanatorium. The newspapers had printed several of these letters but were disposed to put them in an out-of-the-way corner of the paper.

This particular letter, however, had such a poignant appeal that it deserved wide publicity. It was secured by the simple means of having a campaign worker read the letter at a luncheon. The inference was given the reporters that this letter was of so great importance that the speaker had thrown aside his prepared address. The result was that the letter was printed on the first page under large headlines with consequent discussion throughout the community.

Frequently the nurse will have opportunity to present an extended account of some special subject, such as the work of an infant welfare station. Such data may be embodied in what is called a "Sunday feature story". It should be accompanied by photographs showing various phases of the work. Most newspapers are glad to secure such stories of local interest and frequently will assign a special writer and photographer to assist if the editor is convinced in advance of its desirability.

A nurse should remember that the community which supports her work is entitled to know something of its progress. Monthly reports published in local newspapers, giving facts which make an emotional appeal without revealing the identity of those whose story is being told, are one of the best measures for acquainting the public with the progress of the work and developing further interest and effort in the promotion of public health.

A very large part of a community may be reached through the press, but any one who has not had occasion to make house to house visitations would scarcely believe how large a portion of the population of urban and suburban communities rarely read newspapers. In surveys made for referenda for the appropriation of public funds for the establishment of health service it has been found that a large proportion of citizens will not be reached unless circulars, bulletins, special circular letters and other measures are also used to acquaint the public with the proposed undertaking. In public health education this class of people must receive special consideration. To do this, insurance com-

panies have distributed literature calling attention to ordinances which have become a dead letter, but the enforcement of which is essential to the health of their policyholders. When acquainted with facts concerning their rights the people have demanded that the ordinances be enforced. Child welfare organizations have conducted parades which have carried into the byways on blazoned placards and transparencies slogans of the campaign, leaflets have been placed under front and back doors inviting everybody to attend the neighborhood free demonstration, and windows and fences have been placarded with posters and bulletins heralding the special event which nobody should miss. Formal lectures, curb-stone and noon-hour talks and other brief and informal addresses have been utilized to deliver a special message to the people. On nearly all of these occasions specially prepared free literature has been offered to anyone who will take it. This type of work requires careful planning, intelligent observation of the reaction of the people and prompt seizure of opportunities resulting from interest aroused. Results are measured not in the amount of literature distributed, the number of talks given, or the size of the listening crowds, but in the tendency of the people to seek further information on the subjects such as is evidenced by an increase in the number of consultations at the clinics, a demand for more literature and more talks, and in the case of child welfare work, a subsequent decrease in the local loss of child life.

Literature for free distribution. There is a large amount of literature giving the latest scientific information regarding health conservation which is available for free distribution. Federal, State and municipal departments of health and education, insurance companies, philanthropic, religious and scientific organizations have carefully prepared material, not only circulars, pamphlets and posters for this purpose, but also films and stereopticon slides, which are loaned without charge. Much scientific knowledge of this sort finds its way to the people in pamphlet form before it is published in books.

For driving home the lesson in any given locality in such fashion as to secure community action, live facts concerning that

particular place should be presented. To do this charts have been found a good means of visualizing the situation.

Charts and chart making. The equipment necessary in preparing charts suitable for small exhibits, for lecture use or other purposes is simple. Bristol board of a creamy tint can be purchased at almost any stationery store and, in lieu of any other material, common wrapping paper is sufficient. Given a yard stick and a supply of soft crayons or pencils, almost anything in the line of a chart can be prepared.

The most common faults of charts are that they are too small, that the lines are not heavy enough and that the data is not presented in its simplest or most attractive form. Charts should be at least 20x25 inches in size and the lines of the drawings should have a width about equal to the thickness of a half dollar. Whether or not a chart will be legible to a small audience can be determined by holding the chart at arm's length and examining it through half-closed eyes. If the lines then stand out boldly, they will be visible to the ordinary assembly.

A point to remember in the making of charts in colors is to restrict the colors to three — black, green and red. Black is a neutral color, and should be used for general titles and outlines. Green, being the color usually associated in the mind with safety, and red being used to signify danger, these colors may best be utilized to indicate favorable and unfavorable conditions respectively. Therefore, in presenting a chart which will contrast lives lost with lives which might be saved, put the titles in black, the graph expressing the number of lives to be *saved* in green and the column or other "graph" expressing the number of lives *lost* in red.

There are three general rules in regard to charts which must be borne in mind by the one preparing them. These rules, like the point in regard to use of colors, are not easy to explain, but have been developed through years of preparing graphs and may be said to be based upon the psychological effect observed when presenting the charts to audiences of varied composition. These rules are:

1 Charts of a single dimension are the least likely to be misinterpreted.

2 The general arrangement should be from left to right, as one holds the chart before him or faces the chart.

3 The title must be so complete and clear that misinterpretation will be impossible.

For the purposes of the nurse, five forms of graphs or charts may be considered. First in importance is the spot map; second, the horizontal and vertical bars; third, the curve; fourth, the circle with sectors and, fifth, the organization chart.

The spot map is the easiest chart to prepare and, for many purposes, is the most convincing. There are few cities or large municipalities which do not have upon file in their department of public works or engineering blue prints of the city or village. Blue or white prints of these maps usually may be secured at no or slight cost. The so-called white print is the most desirable, for in this all lines appear in dark blue or black against a white background, while in the ordinary blue print the lines are white against a blue background.

In preparing a spot map, one needs only accurate morbidity or mortality statistics. For the small city or community, it usually is desirable to take statistics for a term of years. The extent of tuberculosis in a rural county is likely to appear negligible if based upon a single year, while for a period of five years the number of "spots" will convey a much more convincing impression. The "spots" may be put on with a soft pencil or ink; tiny pasters or pins may also be used.

The horizontal and vertical bar is extremely simple to use in a chart and is scarcely second in effect to the spot map. For many purposes it is superior to any other form of chart. For instance, it may be essential to convey the fact that the infant mortality problem is a "one ward problem," and the relative height of the bars, with the addition of the exact figures at the top of each bar, will bring the fact home conclusively. Reference to annual reports of the State Department of Health will show many examples of the use of the bar graph and illustrate how simple is its adaptation to the presentation of statistics.

The curve holds a peculiar place in the family of graphs, for while it is extremely simple to construct, it is many times open

to error in its interpretation by the layman. It therefore requires explanation to avoid misinterpretation. It is usually adaptable to charts where one wishes to show the incidence of disease or the development of an epidemic.

In preparing curve charts, it is well to have the vertical guide lines accurately spaced so as to represent a certain passage of time — days, weeks, months or years. This permits of accurate charting and, if the lapse of time is cut down to weeks, will bring out facts regarding the development of an epidemic not available otherwise.

The average nurse seldom will wish to use the circle with sectors, not only because its construction requires familiarity with certain mathematical formulæ, but also because it must be handled with nicety to make accurate impressions upon a lay audience.

A forceful variation of this form of graph is in the use of a circle within a circle. A circle may be drawn to represent the total number of deaths from all causes and at all ages in a city for a given year. The size of the circle is determined by the usual mathematical formulæ for calculating areas. A second circle is then prepared, to be drawn in the center of the other. This, for example, may represent the number of deaths under one year of age. The result, if the smaller circle is blocked in with red, is to secure a fair representation of a target which, with a slogan such as "HIT THE BULLSEYE IN GREENWOOD," provides a striking chart for educational use.

The organization chart is used where it is desirable to show how community activities may be coordinated and simplified. Such charts are widely used by research workers to indicate lax or complicated methods of city government, and while not always adaptable to the use of the nurse in health work, are of enough importance to justify a brief description. For example, a nurse may find that the existing public health nurses are not working in cooperation. A city may have a tuberculosis nurse, a school nurse, a charity nurse, an infant welfare nurse, etc., and yet no provision for interchange of ideas or information. A simple chart showing the tangled skein of activity, comparing it with the direct plan desirable, will convince the group of officials who may be too prone to let things go on undisturbed.

The third type of public health education finds its field in the clinic and the home. It is that personal education through contact with teachers, physicians, nurses and social workers in schoolroom, clinic and home, an increase in the demand for which determines largely the success of the other two methods, and creates a need for their modification. In this education process, teachers, physicians, nurses and social workers are learners as well as instructors, and the rapid development of health conservation as a public concern in any community will depend as much upon the open-minded sincerity of this latter group as upon other factors. It is only through conference, team-work and readjustments of policy that health work keeps up with the needs of the times. In their work on Dispensaries, Davis and Warner specify that "the key to successful guidance of policy and administration in any organization is to bring together those who know the facts on which judgment should be based with those who need to know the facts in order to frame judgment." Not until individuals and organizations recognize how much each has to contribute to the knowledge and efficiency of the other, and how great is their interdependence for successful progressive health education will these movements span the chasm existing between the need of the individual and available resources for the maintenance of health.

Knowledge and deftness in application of the knowledge are necessary either in clinic, group relations, or home service. Industry emphasizes the personality of the worker in relation to his task as a matter for careful consideration in employing him for health education work. An acceptable personality added to knowledge of health conservation measures obtainable or creatable, and a habit of studying the psychology of the crowd and the individual are qualifications necessary for a leader who would produce among workers of the world a determination to attain health for themselves and their families, to create a supply of health resources equal to the demand and to materially increase the health and the happiness of the public generally.

In this intimate personal education work the public health nurse should be guided by good pedagogical methods. For the nurse to do the thing herself except as a demonstration is not teaching. Only as she succeeds in aiding the individual to adopt

good hygienic habits, to maintain a hygienic environment and to become an ally in promoting public health can her work be deemed educational. Bed-side nursing is one thing; it involves correction of conditions which the individual can not himself correct; it is essential as a factor in promoting public health. Teaching others to become proficient in health maintenance is an entirely different process. For this reason not every good nurse is a good public health nurse. The success of any given public health nurse must be gauged by what her pupils learn to do for themselves and how keenly they utilize what they learn, rather than by what the nurse herself can do. If her work is good the pupils tend soon to graduate from her tutelage, although if they have found her a good instructor they will be found returning for her counsel and guidance and bringing to her others in need of the same sort of instruction.

CHAPTER XIII

What the Nurse Should Know about Vital Statistics

It is perhaps unfortunate that to the average mind mention of vital statistics suggests a large array of figures and tables, intelligible only to those who have been specially trained in this line. A better conception is that vital statistics are statements of facts; the facts of human life. If this idea is once firmly fixed in the mind of the reader the subject immediately becomes more interesting and more easily understood.

There are three important divisions of vital statistics. These are the

1 Births
2 Marriages
3 Deaths

Some authorities also include divorces, but these are rarely included in any state reports.

Stillbirths are not tabulated either as births or deaths, but under a separate classification. The law requires that in the case of a stillbirth both a birth and death certificate shall be filed. A stillbirth should not, however, be confused with a living birth, no matter how short a time the child may live. If there is any respiration it is a living birth and not a stillbirth.

The distinction, however, between a stillbirth and an abortion or miscarriage is somewhat more difficult, but if the period of uterogestation is as much as five months it should be treated as a stillbirth and reported as such, and both a birth and death certificate should be filed.

The first important facts to know in studying the vital statistics of any community relate to the population;—

First, the number of people in the area to be studied.

Second, the composition of the population by sex and age,—namely, the number of males and the number of females; the number of young children and the number of very old people.

The color is important where there are sufficient negroes to affect the rate, as the negro death rate is always very much higher than the white.

The death rate for very young children and for very old people is very much higher than it is for those in the adult age groups and, consequently, the population in these two groups as compared to the middle adult group is exceedingly important.

Estimates of the number of the population of any city, county or State for any year between censuses are commonly made by what is known as the arithmetical method. This method assumes that the rate of growth during the present censal period will be the same as for that immediately preceding. To illustrate:

The city of "K" had a population June 1, 1900, of 43,872, and on April 15, 1910, of 50,982; what would be the estimated population July 1, 1915?

(Operation)

Elapsed time, June 1, 1900, to April 15, 1910 — 118½ months.

(Pop. 1910), 50,982 — (Pop. 1900), 43,872 — 7,110 gain for 118½ months.

7,110 ÷ 118½ = 60 gain for each month.

Elapsed time from April 15, 1910, to July 1, 1915 = 62½ months.

60 x 62½ + (Pop. 1910), 50,982 = 54,732 estimated population July 1, 1915.

For statistical purposes, the midyear population is always used.

It does not require a second thought to realize that the population of a pioneer country, made up almost entirely of vigorous, rugged men in the prime of life, would tell a very different vital statistics story from a community made up largely of children and old people and from which the healthy adult men and women had emigrated.

What is termed the natural growth of any community is the number of births less the number of deaths. Where the births and deaths are equal the population is stationary,* but even in these days of exceptionally low birth rates, in most parts of the United States the birth rate is usually at least one and one-half times the death rate.

Most communities of the United States are also affected very largely by immigration and emigration. This important factor

* In France for a number of years before the war the births and deaths were almost equal and the population was practically stationary.

depends upon many different things, but very largely upon industrial and agricultural conditions.

The effect of marriage, and particularly the time of marriage, upon the movement of a population, is manifest. It is an axiom that delayed marriages result in small families; consequently anything that defers marriage, be that condition economic or sociologic, directly affects the movement of population. There are many other factors which directly, or indirectly, affect this movement, but it seems unnecessary to discuss them in great detail at this time.

RATES

The births and deaths in a community are usually expressed on the basis of the number of births or deaths per thousand population. For instance, in a city where the population was 10,000 and there were 250 births, the birth rate would be expressed as 25 per 1,000; if there were 150 deaths, the death rate would be expressed as 15 per 1,000. These are what is known as crude or general rates, the term crude being the one more commonly used, and it applies simply to the total number of births or deaths in relation to the whole population. This will always be the first expression of a community rate, but it is subject to many refinements, which will tend to make one locality more accurately comparable with another.

Some statisticians refer to the science of statistics as the science of comparison, and the primary purpose of figuring rates of any kind is for this purpose; it would mean but little to say that the death rate of New York was 15 per thousand if we did not know the rates of other states or countries, but in order to make rates of value for the purpose of comparison great care must be exercised to see that they are really comparable.

Professor Whipple cites the following incident as illustrating the danger of erroneous comparison. During the Spanish-American War one of the New York papers printed a story in which it was shown that the death rate in the United States Navy at the time of war was 9 per 1,000, whereas the rate in New York City was 16 per 1,000, giving the impression that it was safer to be a sailor in the United States Navy in war time than it was to live in New York City.

No consideration was made of the fact that in the United States Navy the personnel was composed of men between 18 and 45 years of age, selected after a rigid physical examination (eliminating all the weak), living an outdoor life under the most hygienic surroundings, well fed and with every possible care exercised to reduce the possibility of sickness or death from disease; whereas in New York City we find every possible element of a population — the sick and the well, the infant and the octogenarian, the palace and the slum, the clean living and the dissipated. Certainly a moment's thought will show that such a comparison means little.

When we consider rates as applied to a particular class of the population, we make what is known as *specific death rates.* The death rate among males is usually higher than among females, and when a rate is made by taking the number of deaths of males in comparison with the number of the male population and the number of deaths of females in comparison with the female population we have made a specific death rate for *sex.*

If we figure the number of deaths of negroes, Mongolians or Indians as compared with the number of negroes, Mongolians or Indians in the population we have then made a specific death rate for *color* or *race.*

When we figure the number of deaths of children under one year of age as compared with the population under one year of age or the number of deaths in each age group, compared with the number of people in each age group, we have then made a specific death rate for *age.*

Specific death rates for disease are exceedingly important and are usually figured on a basis of the number of deaths from any given disease per 100,000 of the population. It is by this means that we are able to compare in a measure the healthfulness of a community. If, for instance, we find that the specific death rate for typhoid fever is much higher in one locality than in another, it indicates what Rosenau describes as "a sanitary short circuit" and suggests a very careful survey of those conditions which are known to produce typhoid fever. If the specific death rate from diarrhea and enteritis in children under two years is higher than

it should be, it indicates the necessity of very definite work in regard to milk supply and the better education of mothers in the care of their babies.

Morbidity statistics are the statistics of sickness and should not be confused with mortality statistics or statistics of death. Unfortunately, perhaps, the average American citizen objects to inquiry in regard to his health, and the State, therefore, does not collect any records of sickness except those toward the prevention and control of which public measures are directed.

Morbidity rates are usually expressed in the number of cases per 100,000 population.

The fatality rates of a disease refer to the percentage of the cases which prove fatal.

Specific death rates are valuable for many comparisons and are frequently used. For the purpose, however, of a general comparison as between communities another form of rate is used which is called a corrected or *standardized* death rate.

These are described by the United States Bureau of the Census as follows:

> "The term 'corrected rates' is employed to signify a rate in the computation of which allowance has been made for difference in age and sex constitution of the population.
>
> When obtaining corrected death rates the usual method is to select a standard population, definitely distributed into certain groups with respect to age or age and sex.
>
> The specific death rates of any area as computed for the same groups are then applied to corresponding subdivisions of the standard population, the result being the number of deaths which would have occurred in each group of the standard population had its death rate been the same as that of the same group in the given area.
>
> The summation of the deaths that would have occurred in all the groups of the standard population gives the total number of deaths in the standard population corresponding to the observed specific death rates in the given area, and the division of this total by the standard population yields the corrected death rate."

The standard population which has been generally accepted by registration officials within the past few years is the standard million of England and Wales, as shown by the census of 1901 and is appended herewith.

Standard Million, England and Wales, 1901

Age Period	*Both Sexes*	*Males*	*Females*
All Ages	1,000,000	483,543	516,457
Under 5 years	114,262	57,039	57,223
5–9 years	107,209	53,462	53,747
10–14 years	102,735	51,370	51,365
15–19 years	99,796	49,420	50,376
20–24 years	95,946	45,273	50,673
25–34 years	161,579	76,425	85,154
35–44 years	122,849	59,394	63,455
45–54 years	89,222	42,924	46,298
55–64 years	59,741	27,913	31,828
65–74 years	33,080	14,691	18,389
75 years and over	13,581	5,632	7,949

The infant mortality rate is perhaps less understood than any other form of rate. The infant mortality rate is the comparison of the number of *deaths* of children under one year of age with the number of *births* which occurred during the same period, and is expressed in the number of deaths per thousand births. This, obviously, has nothing to do with deaths at other age periods. This rate is frequently unreliable because births in many localities are not all reported, and if even a few births are unreported in a community and the deaths are all reported it makes the rate appear higher than it really is.

In the consideration of the infant mortality rate, then, it is essential to carefully study the birth registration of the community and thus be assured of its completeness before an attempt is made to determine an infant mortality rate.

Marriage rates are usually expressed in the terms of the number of marriages per 1,000 population. Some authorities prefer, however, to express the number of people married per 1,000 population, which rate is just double the foregoing.

To understand vital statistics it is essential that we understand the laws under which they are collected.

In this State the law provides for a system of local registrars, one in each city, village and town and state hospital, charitable, or penal institution. In all there are 1,485 registration districts.

In the case of birth the law requires a certificate, fully and completely made out, to be filed with the local registrar within five days by the physician or midwife in attendance, and the law provides a heavy penalty for failure so to do. If there is no attending physician or midwife the law fixes the responsibility upon the father, mother, or householder, in the order named.

In the case of death the law requires that the undertaker shall fill out a death certificate, securing the information as to the name of the decedent, the sex, color, conjugal condition, date of birth, age, occupation and birthplace, name and birthplace of father, maiden name and birthplace of mother, and that he shall cause the certificate to be signed by the informant from whom he obtains this information. He must then present the certificate to the physician last in attendance on the case, who must state the time of his attendance, the cause of death and its duration, the contributory cause, if any, and its duration, and must sign and date the same.

The undertaker then states the place of burial, or removal, and the date thereof, signs and presents the completed certificate to the local registrar, in exchange for which he receives a burial, or removal permit. A heavy penalty attaches to the burial, removal or other disposition of a dead body without first receiving a permit for so doing.

Penalties are also provided for the sexton or person in charge of any cemetery who permits an interment without a burial permit being presented to him.

The local registrars, after duly entering the certificates received in their own records, send the original certificates of both births and deaths to the State Department of Health, where they are classified, indexed and filed as a permanent record. Certificates of birth for school and work purposes and copies of death records for insurance, pension and other legal purposes are issued on request.

There are three important reasons why births and deaths should be registered. These are set forth by the Bureau of the Census as follows:

First, the protection of the rights of an individual and of the community (legal use);

Second, the protection of the lives and the health of the people (sanitary use);

Third, the knowledge of the movement of population (demographic use).

The prompt registration of births provides a legal record which is of value to the child in many ways; for instance, it protects not only the child in its education but also the educational institutions, because with the positive evidence of the age of each child it is not possible to use the schools as a nursery by sending children at an age when the mind is not sufficiently developed to permit its being taught. Again it insures that the child shall not be withdrawn from school until those years have elapsed which the law requires shall be given over to education, and the child can not, therefore, be forced to work by parents who desire to exploit its wage-earning power. The child as a potential citizen is protected in its rights of citizenship, in the right to vote, in the right to inherit and many other important ways.

From a sanitary standpoint we can not hope to reduce the awful life waste caused by infant mortality unless we know where the babies are and can promptly put into the hands of mothers, where it is needed, prompt and proper instruction.

The registration of deaths is important for many legal reasons, as well as for the purposes of insurance, inheritance, and succession.

We are more familiar, however, with the sanitary reason for death registration, as it enables us promptly to find the plague spots and to take measures to eradicate them. We can not successfully fight disease if we do not know where it is and what havoc it is causing.

The demographic reason for the registration of both births and deaths is that we may understand the movement of population, the sources from which it is being renewed and the causes of its depletion.

Nonresident Deaths

If it is desired to study some city closely, allowance may be made for what is known as nonresident deaths. Where there are

considerable hospital facilities in a city, or where there may be a public institution where people are committed by process of law, or where they resort for treatment of disease, this may be a marked factor in producing a high death rate. In those cases the nonresident deaths may be omitted and the true death rate for residents only be thus determined, but when this is done the comparative value of the rate is vitiated, as it would be misleading to compare this with any other city where the rate had not been similarly treated, as almost every city has some hospitals and some nonresident deaths.

If it is desired to compare the relative healthfulness of two cities, however, the elimination of nonresident deaths from both will afford valuable data for detailed study.

It is a difficult problem to attempt the general omission of nonresident deaths and their reassignment to other localities, and until more definite procedure has been agreed upon by registration officials, it is best to confine such action to special studies of restricted areas.

Perhaps the practical use of vital statistics may be shown in the following study which was undertaken to demonstrate the value to the community of public health nursing as a whole, and in particular, the employment of a special baby nurse.

In a city which had a population of about 50,000, the study was made to cover the months of May, June, July and August in the years 1913 and 1914, and included only the deaths of children under two years of age.

Total Deaths Four Months

1913	53	
1914	34	
Gain		35.8%

Months of Occurrence

	1913	1914
May	10	9
June	6	6
July	10	8
August	27	11

The Causes of Death

	1913	1914
Diarrhea and enteritis	28	4
Congenital debility	6	11
Premature births	4	4
Other diseases of early infancy	3	0
Convulsions of infants	2	1
Bronchitis	1	0
Tubercular peritonitis	1	0
Whooping cough	2	3
Bronchopneumonia	2	2
Malaria	1	0
Cerebrospinal meningitis	1	0
Tetanus	1	0
Congenital malformation	0	3
Purulent septicæmia	0	1
Measles	0	2
Food poisoning	0	1
Violence	1	2

Ages

	1913	1914
Under 1 week	14	10
Over 1 week and under 1 month	3	4
Over 1 month and under 6 months	14	7
Over 6 months and under 1 year	13	4
One to two years	9	9

An examination of the causes of death will immediately reveal that this very remarkable improvement was due to a decrease in the number of deaths from diarrhea and enteritis from 28 to 4. In searching for some explanation of this reduction, it was discovered that the summer of 1913 was extremely hot while that of 1914 was quite cool. Under more favorable weather conditions, milk naturally was less quickly spoiled, children slept better and thus were able to build up a greater resistance to infection. It is therefore reasonable to suppose that cooler weather was an important factor in reducing deaths from this cause.

A further survey of the situation revealed the fact that in 1914 the city had greatly improved its supervision of milk supplies and the quality of milk furnished throughout the city was far better than the preceding year. Milk stations had been established, and even the poorest persons were able to secure a high-grade milk for their babies.

Another important consideration was the fact that for the year preceding the summer of 1914 much had been done in the way of baby clinics and of general educational propaganda for the instruction of mothers in the general care of their babies.

These three elements, together with the work of the nursing association, were probably in a large measure responsible for the reduction of this loss of life.

It will be observed by comparison of the age tables that the entire saving occurred among babies under one year of age, the deaths between one and two years being the same in both years.

It will be noted, however, that in the three causes, congenital debility, premature births and other diseases of early infancy, there were 13 deaths reported in 1913, whereas there were 15 in 1914. The reduction in deaths from these causes is generally conceded to be a problem of prenatal work, and it is evident that but little had been done, at least successfully, in this regard during this period.

This little study and these comments are submitted simply to show that the vital statistics open the way for a study of those social and medical elements which largely affect the death rate.

CAUTION

Great care should always be exercised not to be misled by conclusions or rates based upon a small population or a small number of incidents.

A health officer of a small community was much disturbed when informed by one of his friends, as a joke, that 50 per cent of the deaths in his district during the preceding month were caused by appendicitis; after some excitement he discovered that there had been two deaths, one of which was from that disease.

Death rates based upon a small population or a short period must be carefully used or the results will be misleading.

Criticism is occasionally made of the publication of monthly birth and death rates, and this is usually because the purpose of so doing is not generally understood.

The fluctuation of the monthly death rate is usually due to some unusual epidemic or catastrophe, and is, therefore, an indica-

tion of danger, calling into action those forces provided by law to prevent undue loss of life from any cause. Obviously there can be no possible connection between these monthly rates and the annual rates as exceptional months are frequently compensated in following months. In every community, there are always a number of people of great age or invalids who might, under favorable conditions, linger for months on the brink of the grave, but a marked thermal change, or an epidemic of some kind, such as measles, whooping cough, influenza or grippe, will prove too much for their weakened resistance and the death rate goes up accordingly.

A health officer should learn to read the death rates in his community as a mariner reads his barometer, and be prepared to battle with the elements that destroy life.

In a large area, such as the State of New York, slight changes do not make notable fluctuations in the death rate. It takes an increase or decrease of 858 deaths in a month to increase the monthly death rate one unit, or from 15.0 per 1,000 to 16.0 per 1,000 or decrease it to 14.0 per 1,000. In a small community the changes are much more marked. In Niagara Falls, with a population of 44,585, the number of deaths varied in 1916 from a minimum of 33 in November to a maximum of 85 in May, and the death rate for these months from 9.0 to 22.5 per 1,000. In that city a change of four deaths in a monthly rate would have made a difference of 1.3 or from 14.0 to 15.3 per 1,000. In Lockport, with a population of 18,833, the number of deaths varied in 1916 from 19 with a death rate of 12.3 in June to 30 with a death rate of 18.8 in January. Here an increase of one death would have increased the rate from 18.0 to 18.9 per 1,000. Great care must be taken to avoid error in the interpretation of these rates, particularly when applied to a small population.

If it is desired to determine the annual rate instead of the monthly rate, this may be done by adding the number of deaths in any month to the eleven preceding months and dividing the sum by the population. This gives an annual rate based upon the assumption that the number of deaths for the balance of the year will equal the number for the same period of the preceding year.

The monthly rates and the annual rates are two different things

and should be used for different purposes. The sharp fluctuations which may occur in monthly rates are typical of acute disease conditions. It is probable that in many cases by the time these rates are published the cause of the sharp increase has been removed or is under control. On the other hand, a slowly increasing annual death rate compared month by month is typical of what might be termed a chronic condition, and means that there is some disturbing element at work that should be sought out and corrected.

CHAPTER XIV

The Public Health Nurse and Child Welfare Activities

There is no more important field of activity on the part of the public health nurse than that which pertains to the prevention of disease and of deaths among infants and young children. Child welfare work has assumed a greater importance than ever since the World War, for the protection and conservation of childhood is not alone a home problem but is one that affects the community and the nation. The public health nurse should be prepared to supervise the health and surroundings of the child from the earliest prenatal through the adolescent period.

The infant mortality rate is the *comparison* of the number of deaths under one year of age with the number of births which occurred during a given year, and is expressed in the number of deaths per thousand births. Stillbirths, which constitute about 4 per cent of all births, are not included in those used in computing infant mortality although both a birth and a death certificate are required to be filed. If a baby breathes after birth it is not a stillbirth. To obtain the infant mortality rate, divide the number of deaths under one year of age during the year by the number of births occurring during the same period and multiply by 1000.

For example,— a city has 250 births in one year and 30 deaths under one year of age.

$$\frac{30}{250} \times 1000 = 120$$

The infant mortality rate is 120 per 1000 living births.

Before undertaking a health program for any community, then, one should know its infant mortality rate. One should also know in what direction it is tending. A community may have an infant death rate which is not high, and yet it may be slowly rising. Such a condition should lead to a study of the causes producing it in order that they may be corrected.

Sir Arthur Newsholme states that "infant mortality is the most sensitive index we possess of social conditions and a high

death rate among the babies indicates conditions which affect not alone the little children but the entire community." A large percentage, possibly one-third, of infant deaths can be prevented. Why, if preventable, are they not prevented? To answer this question intelligently one must know where and why the babies die and for this information recourse to vital statistics must be had.

A study of the causes of deaths in the first year of life reveals many interesting facts. Nearly one-half occur within the first four weeks after birth and the number of deaths then diminish month by month. The deaths which occur in the first month include those due to congenital malformation, debility and prematurity, and are the result of conditions which affect the child before it is born.

Since it has been shown through a careful study of statistics that nearly one half of all infant deaths occur during the first month of life it is obvious that if the baby welfare service is going to have a chance at saving these lives it must find some way to give care to the mother during her entire pregnancy. This care cannot be given to a group; it must be individual care. As it has been found that it is practically impossible to get any considerable number of prospective mothers to attend clinics or to consult a physician upon invitation, child welfare organizations have sent nurses to homes of *enciente* women to get them under the care of a physician. This method is found to produce results. The nurse may meet with little response during her first visits; here as in other fields personality is a large factor, but if the nurse is enthusiastic over child-saving and at the same time tactful she will find that a large proportion of the prospective mothers will ultimately be persuaded to accept her recommendation.

Quite recently the Children's Bureau of the U. S. Department of Labor has published the "Minimum Standards of Child Welfare" adopted by the Washington and Regional Conferences on Child Welfare. The following extract is taken from their Bureau Publication No. 62:

"Minimum Standards for Public Protection of the Health of Mothers and Children

Maternity

"1 Maternity or prenatal centers, sufficient to provide for all cases not receiving prenatal supervision from private physicians. The work of such a center should include:

(a) Complete physical examination by physician as early in pregnancy as possible, including pelvic measurements, examination of heart, lungs, abdomen, and urine, and the taking of blood pressure; internal examination before seventh month in primipara; examination of urine every four weeks during early months, at least every two weeks after sixth month, and more frequently if indicated; Wassermann test whenever possible, especially when indicated by symptoms.

(b) Instruction in hygiene of maternity and supervision throughout pregnancy, through at least monthly visits to a maternity center until end of sixth month, and every two weeks thereafter. Literature to be given mother to acquaint her with the principles of infant hygiene.

(c) Employment of a sufficient number of public health nurses to do home visiting and to give instructions to expectant mothers in hygiene of pregnancy and early infancy; to make visits and to care for patients in puerperium; and to see that every infant is referred to a children's health center.

(d) Confinement at home by a physician or a properly trained and qualified attendant, or in a hospital.

(e) Nursing service at home at the time of confinement and during the lying-in period, or hospital care.

(f) Daily visits for five days, and at least two other visits during second week by physician or nurse from maternity center.

" (g) At least ten days' rest in bed after a normal delivery, with sufficient household service for four to six weeks to allow mother to recuperate.

(h) Examination by physician six weeks after delivery before discharging patient.

" Where these centers have not yet been established, or where their immediate establishment is impracticable, as many as possible of these provisions here enumerated should be carried out by the community nurse, under the direction of the health officer or local physician.

2 Clinics, such as dental clinics and venereal clinics, for needed treatment during pregnancy.

3 Maternity hospitals, or maternity wards in general hospitals, sufficient to provide care in all complicated cases and for all women wishing hospital care; free or part-payment obstetrical care to be provided in every necessitous case at home or in a hospital.

4 All midwives to be required by law to show adequate training, and to be licensed and supervised.

5 Adequate income to allow the mother to remain in the home through the nursing period.

6 Education of general public as to problems presented by maternal and infant mortality and their solution.

" Infants and Preschool Children

1 Complete birth registration by adequate legislation requiring reporting within three days after birth.

2 Prevention of infantile blindness by making and enforcing adequate laws for treatment of eyes of every infant at birth and supervision of all positive cases.

3 Sufficient number of children's health centers to give health instruction under medical supervision for all infants and children not under care of private physician, and to give instruction in breast feeding and in care and feeding of children to mothers, at least once a month throughout first year, and at regular intervals throughout preschool age. This center to include a nutrition and dental clinic.

"4 Children's health center to provide or to cooperate with sufficient number of public health nurses to make home visits to all infants and children of preschool age needing care — one public health nurse for average general population of 2,000. Visits to the home are for the purpose of instructing the mother in —

(a) Value of breast feeding.
(b) Technic of nursing.
(c) Technic of bath, sleep, clothing, ventilation, and general care of the baby, with demonstrations.
(d) Preparation and technic of artificial feeding.
(e) Dietary essentials and selection of food for the infant and for older children.
(f) Prevention of disease in children.

5 Dental clinics; eye, ear, nose, and throat clinics; venereal and other clinics for the treatment of defects and disease.

6 Children's hospitals, or beds in general hospitals, or provision for medical and nursing care at home, sufficient to care for all sick infants and young children.

7 State licensing and supervision of all child caring institutions or homes in which infants or young children are cared for.

8 General educational work in prevention of communicable disease and in hygiene and feeding of infants and young children."

Infant mortality and sociology are closely related. The problems of how to deal with ignorance, inexperience and poverty, how to restrict the employment of women during the period of child bearing, how to care properly for the mother who is unmarried, how to provide proper facilities especially needed in rural districts at confinement, and how to secure better housing and living conditions for working people must be met if the number of deaths of infants during the first four weeks is to be materially reduced. Deaths from gastrointestinal diseases have been materially reduced by teaching and assisting mothers to breast-feed their babies, to guard them against the forms of danger the imminence of which is announced by the presence of flies, and to provide them with proper conditions for tranquil sleep in properly sheltered and ventilated places.

There is great need for intensive education of mothers and others concerning the danger from the common cold, the importance of early treatment therefor, and the necessity of preventing such infection by avoiding contact with persons having even slight colds.

A careful analysis of the causes that affect the lives and health of children shows the largest factor to be ignorance on the part of the mother. The solution of the infant mortality problem lies in the education of the mother both in the care of herself and her baby. The most effective method of combating this ignorance is by means of what are now known as child welfare stations. The work of these stations is preventive and the aim is to educate, and not to treat disease. They are welfare centers for well babies, and the object is to keep them well. The main functions of a child welfare station may be outlined briefly as follows:

To advise and instruct mothers in the care and feeding of babies;

To encourage and prolong breast feeding;

When artificial feeding is necessary, to see that clean, pasteurized milk is provided, to prescribe suitable mixtures and to insure the proper preparation of the food by the mothers in their own homes;

To teach mothers how to prevent many of the diseases of childhood due to exposure and errors in diet;

To assist in the care, instruction and preparation of the expectant mother;

To supervise the homes and surroundings of boarded out children;

To care for children in the preschool age;

To maintain a place where mothers will come with their troubles and receive sympathetic and intelligent advice.

The child welfare nurse is the most important factor in the success and usefulness of the station. She must have tact, perseverance and the genuine art of leadership among mothers and children.

Some of her duties may be enumerated as follows:

At the station she interviews the mothers and prepares the babies for examination. She keeps all the records and weighs

the babies. She arranges for the lectures and talks and gives practical demonstrations. At the homes she sees that the instructions of the physician are carried out. She instructs the mothers in their own homes how to clothe, care for and feed the baby. When the physician finds defects in older children, such as enlarged tonsils, adenoids, decayed teeth, spinal curvatures, etc., the nurse goes to the homes and sees that these defects are remedied and that proper hygienic and medical treatment is given.

Provisions for extending relief to needy cases should be administered by the nurse, who should be familiar with all the conditions. She should know the philanthropic and relief agencies of the city and keep in touch with them. She should have tact and delicacy in inducing people to use needed public and private agencies for better health conservation. The nurse should have knowledge of the care of pregnant women so that she can give advice and counsel. The nurse should visit the homes and urge mothers to attend the clinics so that the physician may make examination of the urine, test the blood pressure, etc. She should instruct the mothers in the hygiene of pregnancy and early infancy, provide for confinement in a hospital or at home by a physician, make daily visits for at least five days after confinement and two visits the second week and see that proper prophylactic treatment is given the eyes after birth. To secure early prenatal care for all prospective mothers it is essential that nurses establish friendly relations with all local midwives. Most of these women are amenable to friendliness. If they learn that they may expect good faith from the nurse they will in many instances accept her instruction and advice.

The nurse should arrange to be at the station at a stated hour each day so that she can be reached by the mothers.

In the absence of practical instruction of girls in infant care in our public schools the public health nurse should be competent to furnish this instruction in classes at the welfare station. This sort of instruction is now quite generally incorporated into the syllabus for classes in household arts and home making.

The Board of Education in England made the following recommendations for instruction of young school girls in infant care and management:

"At the end of a course in infant care, each girl when she leaves school ought to know how to wash and dress a baby; what clothes it should wear and how to make them; the advantage of natural over artificial food; how much cow's milk a baby requires and how exactly its 'bottle' should be prepared at, say, three, six and nine months of age; how to feed a baby; how to prepare barley water and whey; when the infant may first have solid food, and the character of such food; why patent foods should not be given; what are the signs of indigestion (such as vomiting, diarrhea, constipation or wasting), and why it is important to pay attention to such symptoms; how much sleep is required; how to provide a comfortable and suitable cradle; why fresh air and sunshine are needful, and what is the danger from draughts and cold; how to teach a baby cleanly and desirable habits; why a 'comforter' should not be used; and generally how the home management should be undertaken.

"In all this but little mention need be made of disease and illness. It is not desired to teach every school girl a hotch-potch of semi-medical information on the various ailments and diseases to which infancy is liable, but to give her a simple and practical understanding of those things which make up a healthy home life for little children."

The child welfare nurse should have a working knowledge of food values and dietetics for young children. She should be competent to outline special diets and to demonstrate in the mother's kitchen how the foods are prepared. She should know the faulty health habits that produce malnutrition and undernourishment.

All children, both in the preschool and the school period, should be weighed at least once a month and measured at least twice a year. The ratio between the height and weight is more important in determining the nutrition of the child than in comparing the weight and age as is usually done. The following table prepared by Dr. Thomas Wood is recommended by the Child Health Organization. If a child weighs seven per cent less than the average for its height it should be considered undernourished. Overnourishment to the extent of 15 per cent over the average should be considered abnormal and be remedied by suitable diet, exercise and health habits.

RIGHT HEIGHT AND WEIGHT FOR GIRLS

Height inches.	5 yrs.	6 yrs.	7 yrs.	8 yrs.	9 yrs.	10 yrs.	11 yrs.	12 yrs.	13 yrs.	14 yrs.	15 yrs.	16 yrs.	17 yrs.	18 yrs.
39	34	35	36											
40	36	37	38											
41	38	39	40											
42	40	41	42	43										
43	42	42	43	44										
44	44	45	45	46										
45	46	47	47	48	49									
46	48	48	49	50	51									
47	.....	49	50	51	52	53								
48	.....	51	52	53	54	55	56							
49	.....	53	54	55	56	57	58							
50	.....	.....	56	57	58	59	60	61						
51	.....	.....	59	60	61	62	63	64						
52	.....	.....	62	63	64	65	66	67						
53	.....	.....	.....	66	67	68	68	69	70					
54	.....	.....	.....	68	69	70	71	72	73					
55	.....	.....	.....	.....	72	73	74	75	76	77				
56	.....	.....	.....	.....	76	77	78	79	80	81				
57	.....	.....	.....	.....	.....	81	82	83	84	85	86			
58	.....	.....	.....	.....	.....	85	86	87	88	89	90	91		
59	.....	.....	.....	.....	.....	89	90	91	93	94	95	96	98	
60	.....	.....	.....	.....	.....	.....	94	95	97	99	100	102	104	106
61	.....	.....	.....	.....	.....	.....	99	101	102	104	106	108	109	111
62	.....	.....	.....	.....	.....	.....	104	106	107	109	111	113	114	115
63	.....	.....	.....	.....	.....	.....	109	111	112	113	115	117	118	119
64	.....	.....	.....	.....	.....	.....	.....	115	117	118	119	120	121	122
65	.....	.....	.....	.....	.....	.....	.....	117	119	120	122	123	124	125
66	.....	.....	.....	.....	.....	.....	.....	119	121	122	124	126	127	128
67	.....	.....	.....	.....	.....	.....	.....	.....	124	126	127	128	129	130
68	.....	.....	.....	.....	.....	.....	.....	.....	126	128	130	132	133	134
69	.....	.....	.....	.....	.....	.....	.....	.....	129	131	133	135	136	137
70	.....	.....	.....	.....	.....	.....	.....	.....	.....	134	136	138	139	140
71	.....	.....	.....	.....	.....	.....	.....	.....	.....	138	140	142	143	144
72	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	145	147	148	149

PREPARED BY DR. THOMAS D. WOOD.

About what a girl should gain each month.

AGE		AGE	
5 to 8	6 oz.	14 to 16	8 oz.
8 to 11	8 oz.	16 to 18	4 oz.
11 to 14	12 oz.		

Weights and measures should be taken without shoes and in only the usual indoor clothes.

RIGHT HEIGHT AND WEIGHT FOR BOYS

Height inches.	5 yrs.	6 yrs.	7 yrs.	8 yrs.	9 yrs.	10 yrs.	11 yrs.	12 yrs.	13 yrs.	14 yrs.	15 yrs.	16 yrs.	17 yrs.	18 yrs.
39	35	36	37											
40	37	38	39											
41	39	40	41											
42	41	42	43	44										
43	43	44	45	46										
44	45	46	46	47										
45	47	47	48	48	49									
46	48	49	50	50	51									
47	.....	51	52	52	53	54								
48	.....	53	54	55	55	56	57							
49	.....	55	56	57	58	58	59							
50	.....	.....	58	59	60	60	61	62						
51	.....	.....	60	61	62	63	64	65						
52	.....	.....	62	63	64	65	67	68						
53	.....	.....	.....	66	67	68	69	70	71					
54	.....	.....	.....	69	70	71	72	73	74					
55	.....	.....	.....	.....	73	74	75	76	77	78				
56	.....	.....	.....	.....	77	78	79	80	81	82				
57	.....	.....	.....	.....	.....	81	82	83	84	85	86			
58	.....	.....	.....	.....	.....	84	85	86	87	88	90	91		
59	.....	.....	.....	.....	.....	87	88	89	90	92	94	96	97	
60	.....	.....	.....	.....	.....	91	92	93	94	97	99	101	102	
61	.....	.....	.....	.....	.....	.....	95	97	99	102	104	106	108	110
62	.....	.....	.....	.....	.....	.....	100	102	104	106	109	111	113	116
63	.....	.....	.....	.....	.....	.....	105	107	109	111	114	115	117	119
64	.....	.....	.....	.....	.....	.....	.....	113	115	117	118	119	120	122
65	.....	.....	.....	.....	.....	.....	.....	.....	120	122	123	124	125	126
66	.....	.....	.....	.....	.....	.....	.....	.....	125	126	127	128	129	130
67	.....	.....	.....	.....	.....	.....	.....	.....	130	131	132	133	134	135
68	.....	.....	.....	.....	.....	.....	.....	.....	134	135	136	137	138	139
69	.....	.....	.....	.....	.....	.....	.....	.....	138	139	140	141	142	143
70	.....	.....	.....	.....	.....	.....	.....	.....	.....	142	144	145	146	147
71	.....	.....	.....	.....	.....	.....	.....	.....	.....	147	149	150	151	152
72	.....	.....	.....	.....	.....	.....	.....	.....	.....	152	154	155	156	157
73	.....	.....	.....	.....	.....	.....	.....	.....	.....	157	159	160	161	162
74	.....	.....	.....	.....	.....	.....	.....	.....	.....	162	164	165	166	167
75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	169	170	171	172
76	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	174	175	176	177

PREPARED BY DR. THOMAS D. WOOD.

About what a boy should gain each month.

AGE		AGE	
5 to 8	6 oz.	12 to 16	16 oz.
8 to 12	8 oz.	16 to 18	8 oz.

Weigh on the same date each month about the same hour of the day.

Health supervision and education of the school child in the State of New York is definitely assigned through legislative enactment to the State Department of Education. Yet school children are for the major part of their time outside of school control and in many communities health work in the schools is undergoing very slow growth. It is therefore important that every public health nurse, especially those engaged in child welfare, should consider the life of the child in its entirety. For this reason the following minimum standards for the school and the adolescent child, which, with those previously quoted, comprise those established by the Children's Bureau, are here inserted.

"Minimum Standards in Child Welfare for School Children

1 Proper location, construction, hygiene, ventilation, and sanitation of schoolhouse; adequate room space — no overcrowding.
2 Adequate playground and recreational facilities, physical training, and supervised recreation.
3 Adequate space and equipment for school medical work and available laboratory service.
4 Full-time school nurse to give instruction in personal hygiene and diet, to make home visits to advise and instruct mothers in principles of hygiene and nutrition and to take children to clinics with permission of parents.
5 Part-time physician with one full-time nurse for not more than 2,000 children; if physician is not available, one school nurse for every 1,000 children; or full-time physician with two full-time nurses for 4,000 children for:
   (a) Complete standardized basic physical examinations once a year, with determination of weight and height at beginning and end of each school year; monthly weighing wherever possible.
   (b) Continuous health record for each child to be kept on file with other records of the pupil. This should be a continuation of the preschool health record which should accompany the child to school.
   (c) Special examinations to be made of children referred by teacher or nurse.
   (d) Supervision to control communicable disease.
   (e) Recommendation of treatment for all remediable defects, diseases, deformities, and cases of malnutrition.

"(f) Follow-up work by nurse to see that physician's recommendations are carried out.

6 Available clinics for dentistry, nose, throat, eye, ear, skin, and orthopedic work; and for free vaccination against smallpox.

7 Open-air classes with rest periods and supplementary feedings for pretuberculars and certain tuberculous children, and children with grave malnutrition. Special classes for children needing some form of special instruction due to physical or mental defect.

8 Nutrition classes for physically subnormal children, and the maintenance of midmorning lunch or hot noonday meal when necessary.

9 Examinations by psychiatrist of all atypical or retarded children.

10 Education of school child in health habits, including hygiene and care of young children.

11 General educational work in health and hygiene, including education of parent and teacher, to secure full cooperation in health program.

"ADOLESCENT CHILDREN

1 Complete standardized basic physical examination by physician, including weight and height, at least once a year, and recommendation for necessary treatment to be given at children's health center, school, or other available agency.

2 Clinics for treatment for defect and disease.

3 Supervision and instruction to insure:

(a) Ample diet, with special attention to growth-producing foods.

(b) Sufficient sleep and rest and fresh air.

(c) Adequate and suitable clothing.

(d) Proper exercise for physical development.

(e) Knowledge of sex hygiene and reproduction.

4 Full time education compulsory to at least 16 years of age, adapted to meet the needs and interest of the adolescent mind, with vocational guidance and training.

5 Clean, ample recreational opportunities to meet social needs, with supervision of commercial amusements.

6 Legal protection from exploitation, vice, drug habits, etc."

CHAPTER XV

Supervision of Midwives

The following laws and regulations govern the practice of midwifery in the State of New York:

Chapter 559, *Laws of* 1913. (§ 2-b Sanitary Code):— The public health council shall have power by the affirmative vote of a majority of its members to establish and from time to time amend sanitary regulations, hereinafter called the sanitary code, without discrimination against any licensed physicians. The sanitary code may deal with any matters affecting the security of life or health or the preservation and improvement of public health in the state of New York, and with any matters as to which jurisdiction is hereinafter conferred upon the public health council. The sanitary code may include provisions regulating the practice of midwifery.

These regulations are found in chapter IV of the sanitary code a copy of which may be obtained by applying to the State Department of Health, Albany, N. Y.

The Penal Law, Section 482, Paragraphs 3 and 4 contain the following:

A person who: (3.)— Being a midwife, nurse or other person having the care of an infant within the age of two weeks neglects or omits to report immediately to the health officer or to a legally qualified practitioner of medicine of the city, town or place where such child is being cared for, the fact that one or both eyes of such infant are inflamed or reddened whenever such shall be the case, or who applies any remedy therefor without the advice, or except by the direction of such officer or physician; or, (4.)— neglects, refuses or omits to comply with any provisions of this section, . . . is guilty of a misdemeanor.

What the Midwife Must Do to Practice

She must:

1 Secure her license to practice from the State Department of Health, the license to be renewed on January first annually;

2 Register annually her name with the local registrar of vital statistics in each municipality in which she desires to practice;

3 File birth certificates within five days after birth with the local registrar of vital statistics of the place in which birth occurs;

4. If a child does not breathe after birth (stillbirth), leave the birth certificate at the house and *at once* report the case by telephone, messenger, or in person, to the health officer. He will personally investigate, or send an inspector to do so, and will countersign the birth certificate and file it with the registrar. A midwife can not sign the death certificate for a stillborn child — this must be done by the health officer, or by a coroner or similar public officer if an inquest on the body is necessary, as provided by section 378 of the Vital Statistics Law;

5 Secure from the local health officer and keep on hand a sufficient supply of ophthalmia neonatorum outfits and make use of these according to directions, in every case;

6 Keep a record of births reported by her on the stub of her record;

7 Comply in every respect with the rules and regulations governing the practice of midwifery.

PENALTIES

The penalty for violation of regulations of the Sanitary Code (Chapter 1, Regulation 2) is:

Any violation of any provision of this code is hereby declared to be a misdemeanor and is punishable by a fine of not more than fifty dollars or by imprisonment for not more than six months, or by both.

The penalty for violation of health laws, (Section 1740, paragraph 2, Penal Law) is:

A person who wilfully violates any provision of the health laws, or any regulation lawfully made or established by any public officer or board under authority of the health laws the punishment for violating which is not otherwise prescribed by those laws, or by this chapter, is punishable by imprisonment not exceeding one year, or by a fine not exceeding two thousand dollars or by both.

The penalty for failure to report a birth in accordance with the requirements of the Vital Statistics Law (Par. 392, Vital Statistics Law) is:

"* * * Whenever any physician, midwife, or other person shall fail or neglect to properly record and file a certificate of birth as required by this article, such person shall be liable to a penalty of not less than five dollars nor more than fifty dollars for the first and second offenses, which penalty may be recovered by an action brought by the state commissioner of health in any court of competent jurisdiction, and for every subsequent offense, such person shall be guilty of a misdemeanor, punishable by a fine of not less than ten nor more than one hundred dollars, or by imprisonment for not more than sixty days, or both."

Directions for the Inspection of Midwives

1 Visit each midwife at the address given upon the list furnished you. In case the midwife is out you should visit and revisit until she is found. If she has moved to a new address you should go to the new address. Ask the midwife to show her license, and see that the name and address correspond. If a midwife is married report to the Department of Health if the license does not contain her married name.

2 See that the midwife's sign corresponds with the name upon the license, and that there is no misleading information on her sign, card, advertisement, or any handbill. Copies of the three latter should be obtained.

3 Remember that the license is for one year only, and if it is to expire within a short time notify the midwife that she must obtain a new license from the State Department of Health.

4 Note the general character of the house in which the midwife lives. Note also the general condition of the home as to neatness and cleanliness.

5 Note the condition of the midwife's person — her clothing, hands and fingernails. The clothing should be neat and clean, and the hands and fingernails clean, smooth and short.

6 Examine the stubs of the midwife's records of births, and note whether or not they are properly kept and legible. Ascertain whether or not the midwife can read and understand a paragraph of the regulations, and whether she can fully fill out a birth certificate in her own handwriting.

7 Inspect the equipment, and see if the following articles are in the midwife's bag:

Nail brush
Wooden or bone nail cleaner
Jar of green or soft castile soap
Tube of vaseline
Clinical thermometer
Agate or glass douche reservoir
Two rounded vaginal douche nozzles (not to be used except upon physician's order)
Two rectal nozzles, large and small
One soft rubber catheter
Blunt scissors for cutting cord
Lysol
Boric acid powder
Medicine dropper
Narrow tape or soft twine for tying cord
Sterile absorbent cotton (preferably in ¼ lb. packages)
Silver nitrate outfits furnished by the State Department of Health free of charge.

Each and every article should be inspected and opposite this list you should write "G" or "B" and "C" or "D", for "Good" and "Bad", "Clean" or "Dirty".

8 Note the condition of the bag, whether or not it contains a washable lining or metal case; whether it is in good or bad condition, clean or dirty.

9 Ascertain whether the midwife has in her possession any instruments, and inquire particularly as to the following:

Speculum
Dressing forceps
Uterine dressing forceps
Obstetrical forceps
Uterine sound or applicator
Hypodermic syringe
Artery clamps
Uterine irrigators
Wire catheters
Uterine syringes
Any other instrument.

In case you have any suspicion, ask to be shown any cupboards or closets where such instruments could be concealed.

Ask the midwife to surrender any instrument and state that if any are found on subsequent visits you will recommend cancelling her license.

10 Note whether or not the midwife has an examining chair or table which might be used for either operations or treatments.

11 Ascertain whether the midwife has any drugs in her possession, other than the disinfectant required for her practice, and whether or not she has a medicine case or cabinet. Do not include personal household remedies or cosmetics.

12 Note whether the midwife has a sufficient supply of ophthalmia neonatorum outfits. If she has not, she should be advised that she can get them from the local health officer.

The midwife should have in her possession a copy of Rules and Regulations for Midwives.

13 Note whether there are accommodations for the delivery of women at the midwife's home. Their presence should arouse suspicion that the midwife might possibly be inducing abortions or labor and delivering women who desire secrecy.

14 In using the form for the inspection of midwives report as below under each heading.

(a) If license sign and name are correct, mark O. K., if incorrect, state "Inc," and notify the Albany office.

(b) Note, with letters "G" or "B", if good or bad; "C" or "D", if clean or dirty.

(c) Note "P" or "A" for present or absent; "W" or "NW" for washable or nonwashable.

(d) Inspect record of births, and if any are not recorded see that local registrar receives the report; and advise midwife that such an oversight is a violation of the law, and report to the Director of the Division of Vital Statistics.

(e) Note number of cases attended.

(f) Note whether or not physician was called, and if so for what reason.

(g) Inquire as to the general health of the midwife and her family. Also inquire whether or not there has been any

communicable disease in the home. Give instructions as to precautions to be taken in a case of communicable disease. (See Rules and Regulations for Midwives issued by State Department of Health.)

(h) State whether wholly self-supporting or partly self-supporting and state what other work, if any.

(i) Report the presence or absence of instruments. See Rule No. 9.

(j) Report whether any additional beds are present. See Rule 13.

15. On inspection form (page 2), check list of equipment and note condition "G" or "B" and note instruments found, if any.

16 Each form must be made in duplicate and one sent to the Albany office and one retained by the nurse.

17 Visit each midwife during the thirty days previous to the expiration of her license and write to the Albany office whether or not you recommend the renewal of her license, stating why. If operating under an old license such license should be taken and mailed to the Albany office.

18 Visit the office of the local registrar and ask whether each midwife on your list is duly registered in his office as required by law. Ask also if he knows of any midwives not licensed but practicing; whether any midwife is late in filing certificates of birth, and any other information which he happens to have in regard to any individual midwife. See that unlicensed women are not registered.

19 Inquire of each midwife if she knows of any other women practicing in her neighborhood and visit any whom you think may be practicing without a license.

20 If these directions are lost or mislaid or new forms are needed apply at the Albany office.

When births are discovered that are apparently or possibly unreported fill out a blank certificate of birth and have it signed by the parent, or if the parent is illiterate the parent should make his or her mark, the nurse signing as witness.

The nurse should examine the register kept by the local registrar of vital statistics to see if the birth has been reported. If unreported she should file her certificate with the registrar. If

the child was born in another municipality, not visited by the nurse, the certificate should be mailed by the nurse to the registrar of the municipality in which the child was born with a statement of facts. If the nurse can not readily secure the name of the registrar of the other municipality, she should forward it addressed to "Registrar of Town (or Village or City) of .....". Blank certificates for birth reports are supplied by the State Department of Health to all local registrars from whom they may be secured as needed.

When a nurse finds a woman practicing who apparently is unlicensed, or who can not show her license she should notify the State Department of Health giving the name and address of such woman.

CHAPTER XVI

Health Supervision of the School Child

Health supervision of the school child has been the logical result of compulsory public education. The State provides the equipment for education and compels the child to utilize it. To assemble the state's children in the various school houses was the surest way to discover defects from heredity and environment in the individual. To attempt to determine clearly the nature of these defects and to correct such as were remediable was an inevitable result, necessitating for its accomplishment a more intimate relation between those who control the child in school and those who are responsible for him out of school. It has long been recognized that certain defects increase during school years, and may be classed as occupational. Obviously the school should prevent the development of these defects. A high educational authority has said that 87½ per cent of all education is physical.

The value of the nurse's service in the community will depend on her ability to secure correction of insanitary conditions in the home as well as in the school room. There has been considerable discussion as to whether the school nurse should be assigned to the routine examination of children for physical defects and to classroom inspection to discover communicable disease. Local conditions, expediency and the qualifications of the individual nurse are bound to be deciding factors in most schools. No thinking person can doubt that a nurse technically well trained can discover when vision or hearing is not normal, when speech defects exist, when there is nervous disturbance, and when there are symptoms of infectious disease which call for exclusion from the classroom, and that she can properly record subsequent observations of such cases.* But the decision of which is the cause of the trouble must rest with the physician. It will often take both physician and nurse to determine the nature and cause of an existing disturbance and to secure its correction.

* It is also undoubtedly true that teachers can be so trained in normal schools that they may satisfactorily perform such usual classroom inspection.

The interest of school authorities, teachers, parents, and the general public must frequently be enlisted before certain children will have been provided with the fundamental essentials for a healthful life and good citizenship. The provision for school instruction in the open air is one instance where community interest has had to be aroused and guided to insure to certain children a chance to live. Thus far this community interest has been largely confined to urban schools. To secure rural community action, to transform conditions in the one room rural school so that it will be comparable to an open air school is an urgent and vital need in the solution of which the public health nurse will have the opportunity for all the service and cooperative work of which she is capable. When the work is accomplished the children will not only be studying in the open air, but they will be warmly and suitably clothed, wisely and abundantly fed, as clean in body and clothing as soap, water and a will to be clean can make them, and they will be getting ten hours sleep out of each twenty-four.

Physical Defects in the Child

The following tables indicate the physical condition of school children as shown in several communities.

In a recent examination of newly admitted school children in the City of New York 5,780 cases were examined by the school physicians and 5,940 by private physicians.

The percentage of defects found were as follows:

	Examination by School Medical Inspectors	Examination by Private Physicians *
Defective vision	7.	4.
Defective hearing	.38	.77
Defective teeth	71.2	36.5
Defective nasal breathing	12.3	12.2
Hypertrophied tonsils	13.1	21.8
Malnutrition	6.3	12.9
Cardiac disease	1.1	2.1
Pulmonary disease	.81	1.9
Orthopedic defects	1.1	1.7
Nervous diseases	.91	3.9

* Dr. Haven Emerson, New York State Journal of Medicine, May, 1916.

It is interesting to note that in New York City 16 per cent of the children's parents employed a private physician. The extra expense of including these children in the medical examination by the health department physicians and nurses would have been 39 cents per capita.*

An inspection of children in the rural schools of Pennsylvania in districts with population of less than 5,000 made by the Pennsylvania State Department of Health gave results as follows:†

Number of children inspected	17,697
Defective teeth	53.7%
Dirty teeth	8.4%
Gums diseased	45.3%
Tonsils enlarged	26.3%
Adenoids	34.8%
Enlarged cervical glands	4.9%
Goitre	4.9%
Defective vision	17.8%
Other eye affections	3.1%
Malnutrition	48.7%
Tuberculosis	4.4%
Head lice	27.5%
Other skin diseases	8. %
Deformities — spinal curvature	1. %
Other deformities	9.3%
Defective hearing	3.3%
Defective breathing	4.9%

Concerning the presence of multiple defects in children of rural districts and the results in treatment through advising the parent or guardian by letter, Dr. Samuel G. Dixon in the article to which reference has already been made, gives the following interesting figures:

Total number of pupils inspected	469,199
Defective	335,427
Not defective	133,772
Single defects in	184,900
Multiple defects in	150,527
Total defects	551,671
Pupils' treatment advised by letter to parent or guardian	304,619
Pupils' reported treated (18% of notifications)	54,941
Pupils' improved by treatment (95% of those treated)	52,405

* Weekly Bulletin of the Department of Health, City of New York, June 24, 1916.

† Some results of the Health Inspections of Four Hundred Thousand Rural School Children in Pennsylvania — Samuel G. Dixon, Commissioner of Health, Pennsylvania.

From the foregoing records the nurse is justified in concluding that:

(a) approximately 50 per cent of all children on their first admission to school are in need of immediate attention for throat and mouth or eye defects;

(b) a good percentage of the defects will be remedied to the improvement of the health of the child if the parent or guardian is notified in writing;

(c) in notifying the parent or guardian it is desirable to enclose literature designed to teach adults the importance of oral hygiene, and the necessity for accurate correction of defects of vision;

(d) provision should be made for the correction of the defects of children whose parents do not provide the treatment necessary after notification;

(e) the public health nurse is the best agent for accomplishing the greatest results;

(f) when multiple defects exists, record should be made of mental, nutritional and general physical improvement following treatment of oral and vision defects in order to furnish data for further study and conclusions.

Methods for Securing Correction of Defects When Parents Do Not or Can Not Attend to the Matter

Whenever after a reasonable time any child has not had treatment for the defective condition, the nurse should visit the home to urge the importance of such corrective treatment. Sometimes six and eight visits of this nature must be made before the parents sufficiently appreciate the situation to consult a private physician or consent to pay for treatment when provided at cost. For children in rural districts an arrangement may sometimes be made with local physicians or dentists for a day when all cases may receive operative or other treatment at cost, or without cost for any who should have it so provided. In some instances a date is arranged in some neighboring city and a group of children is taken to a hospital or dispensary for operation. Mobile eye and dental dispensaries are now being operated in some parts

of New York State for the benefit of rural children. Under adult stimulation the children themselves frequently organize remedial measures as valuable for educational as for corrective ends, as for example, the Nassau County Junior Red Cross Dental Clinic.

A progressive superintendent of schools in a rural village of New York State arranged to have medical and surgical service brought from a neighboring city on certain days. On these days the teachers, local nurses and citizens assisted at a community session for dispensary and clinic service. In the library of the school cots were placed, while the superintendent's office was the operating room, the school nurse managing the nursing side of the function. The domestic science class washed the towels and helped in the general clean-up. With a little enterprise and enthusiasm this community work may be developed in any rural district. A well written newspaper account of how it was done inspires other neighborhoods.

The two factors which the nurse will find necessary for the accomplishment of this corrective work are the recognition that it is needed and the development of a desire on the part of the people to provide it. The cost of the work under such community initiative will be reduced to a minimum, and will come within the means of a large proportion of both native and foreign born parents. The nurse should know the number and the nature of her cases, and she should find out the comparative cost in time and money of taking the children to another place, and of bringing the treatment to the children. The preferences of local physicians and dentists should be considered before any decision is reached.

SOME RESULTS TO HEALTH FROM THE CONTINUED PRESENCE OF PHYSICAL DEFECTS

From Decaying Teeth and Diseased Gums and Tonsils

Oral sepsis as a factor in general systemic disturbance has for some time been generally recognized. That decaying teeth — even those of the temporary set — may result in disease of the tonsils, middle ear, and glands of the neck has been long recognized; more recent is the knowledge that arthritis, endocarditis, deafness, functional heart disturbance, mastoid disease, asthma,

goitre, frequent sore throat, neuritis, appendicitis and cholecystitis often are caused by a septic focus in one or more teeth, or from diseased tonsils. Insanitary fillings, insanitary crowns and other forms of dentistry have resulted in as much general disturbance as have totally neglected teeth. Diseased tonsils and dental caries may produce conditions favorable for infection with communicable disease, including tuberculosis.

Adenoids and eye defects are the cause of much backwardness in mental development, of faulty posture and of general nutritional disturbance.

Deafness, anemia, nutritional disturbances, mental sluggishness, glandular swelling and spinal curvature are frequently fairly easily corrected when hygienic care of the oral and buccal cavities is established. Nervous disorders in children may have their origin in some of the above named defects. The nurse can not place too much emphasis on the value of their prompt correction. "One result of five years' work (in mouth hygiene work at Bridgeport, Conn.) is an average reduction of 33.9 per cent in the number of cavities in the permanent teeth of the fifth grade children . . . No repair work had been provided for these children; the work consisted of prophylactic treatments, toothbrush drills, and instruction in mouth hygiene." (See 1919 Report of the U. S. Commissioner of Education.)

Sore Eyes and Blindness

If in her visits to the home any child under two weeks of age is found with sore eyes, the nurse is required by Section 288, paragraphs 3 and 4 of the Penal Code to report the fact immediately to the local health officer or to a local qualified practitioner of medicine. Failure to comply with this law, or for the nurse to undertake to treat the case without medical advice is a misdemeanor. The penalty for a misdemeanor is a fine of not more than two hundred dollars or imprisonment of not more than six months or both. Regulation 6, Chapter II of the Sanitary Code requires that a visiting or public health nurse report at once to the local health officer any case of disease presumably communicable. These two laws, therefore, make it mandatory that

all cases of inflamed or sore eyes in infants shall be reported at once by the nurse to the local health officer. Many nurses do not know this fact. A smear of the discharge may be made and sent to the State Laboratory at Albany to facilitate diagnosis.

If any person is found blind or in danger of blindness and not under medical care the nurse should inform the New York State Commission for the Blind. The Commission will promptly institute measures for prevention or relief.

THE EYES AND EARS OF SCHOOL CHILDREN *

"The State Medical Inspection Law (Laws of 1913, chapter 627) provides that medical inspectors or principals and teachers in charge of public schools shall make eye and ear tests of the pupils in such schools at least once in each school year, and that the school authorities shall be furnished with 'suitable rules of instruction as to tests and examinations' so made, together with test cards, blanks, record books and other useful appliances for carrying out the purposes of this article.

In compliance with this law, the State Commissioner of Education prescribes the following:

"Instructions to Teachers, for Examination of the Eyes and Ears of School Children

1 *The aim of the school tests.* The mere examination of eyes and ears and recording of statistics are of no value to the children. Unless their defects of vision and hearing and any other eye and ear troubles that are discoverable by the teacher are brought to the attention of parents and guardians, the examination will fail of its purpose. But this is not all. A child is not relieved by merely telling his parent or guardian that he has a remediable trouble of the eye or ear. The case must be taken to a competent eye or ear specialist who should report to the school on the blank provided for this purpose.

* Copy of circular issued by the New York State Department of Education.

"This should always be done through the activity of the family physician who either attends the case himself or refers it to an expert on eye or ear conditions.

"One of the objects of the medical inspection law is to prevent every possible case of preventable disease from developing among school children and to apply the right remedies to every case of disease or defect that can be cured or relieved while in school. The law gives the teacher a large share of responsibility in attaining this object.

"2 *Time of the tests.* These tests should be made as soon as possible after the beginning of the school year in order that the defects thus discovered may receive early attention. Pupils entering school after the regular tests have been made should be tested as promptly as possible. The date of the test should be entered on every pupil's record.

"3 *Conditions of tests.* Tests should be made under uniform conditions, as nearly as possible, and these conditions should be the most favorable that can be attained. Tests of vision should be made in the forenoon, if convenient, and never after 3 p. m. If the day appointed should happen to be cloudy or dark it would be necessary to postpone the tests, unless proper artificial light were available.

"Children should always be examined singly and should be screened from the sight of the rest of the class. If possible, a separate room should be used for these tests.

"4 *Personal history of pupil.* The following facts should be recorded for *each* pupil, regardless of age:

a Name
b School and grade
c Date
d Age (date of birth)
e What serious illnesses have you ever had? (date if possible)
f Do you have headaches? How often, how severe, and in what part of the head? Are they afternoon headaches? Worse after using the eyes? Absent on Saturday or Sunday?
g Do you have pain in the eyes?

h Do you have dizziness or nausea? (Are you 'sick at the stomach?')
i Do you have trouble in reading the book or blackboard?
j Do you often 'see double?'
k Do you have earache? How often and how severe?
l Did you ever have running ears? (date if possible)
m Do you breathe through your nose easily?
n Do you think you can hear as well as other children?
o Do you have frequent colds in the head, with discharge from the nose and throat?

"Young children do not give reliable answers to the above questions. The teacher should, if possible, secure the desired information from parents or older brothers and sisters. When a child's history is unfavorable in respect to the points just mentioned, his parents should secure competent medical advice for him, without regard to the results of the eye and ear tests described below. The physician to whom the case is referred should report to the school on the blank provided for this purpose.

"5 *Observation by teacher or nurse.* The teacher will often be able to answer some of the questions on the above list. She should also record the results of her observations of each pupil under the following heads, not depending on the child's statements alone:

a Are the child's eyes straight? Is he cross-eyed or 'wall-eyed?'
b Does he squint or frown habitually?
c Can he read from the blackboard as readily as other pupils?
d Does he hold his book 12 to 14 inches from the eyes?
e Does his posture while reading indicate any difficulty in seeing distinctly?
f Is he easily fatigued, and does the use of his eyes appear to increase fatigue?
g Are the eyes healthy in color and appearance?
h Are the eyelids healthy in color and appearance?
i Does it seem that the child's eyes are oversensitive to light?
j Does he seem to hear easily at ordinary distances?

k Does his posture or attitude indicate any difficulty in hearing?

l Does he often say "What?" when asked a question, or ask you to repeat the question?

m Is he usually attentive and interested in what others are saying?

n Do the ears look healthy?

o Are the ears obstructed by wax?

"The above items constitute a personal history of the child and are of great significance in deciding whether the child shall be sent to a doctor for further examination and diagnosis. Doubtful or unfavorable answers to any of these questions would warrant the teacher in warning the parents concerning the child's eyes or ears.

"Defects of vision and hearing are often insidious in their origin and development. For this reason, children in school should be observed closely in order to detect the first indications of failing sight or hearing. When defects are found or even suspected, the child should have the advantage of expert examination and treatment without any hesitation or unnecessary delay. Above all things, the school authorities, medical inspector and nurse should make the required examinations and tests with a full knowledge of their significance.

"6 *Preparation for tests of vision; apparatus, etc.* The teacher should secure the information called for above before beginning the tests of vision and hearing. She should then study the following directions most carefully and see that all preparations have been completed.

"The tests of vision are made by using a Snellen's Test Card containing letters and 'inverted E's' adapted to the vision of the normal eye at distances of 200, 100, 70, 50, 40, 30 and 20 feet respectively. The Snellen card can be obtained from local opticians, printers of school blanks, etc. The card should be kept well protected from light and dust and should *never be exhibited to the pupils except during the test of vision* as children readily memorize the letters.

The card should be hung with the 20-foot line on a level with

the child's eyes. It should be well illuminated and should not reflect a strong light into the eyes of the child. It should be out of sight of the class. The child should sit directly in front of the card at a distance of exactly 20 feet between the eyes and the card. There should be no cross lights or reflections from windows or blackboards to dazzle the child during the test.

While conducting the test the teacher should stand near the test card. If it seems desirable she may point to the letters, using an ordinary 'pointer.' She must not interfere with the illumination of the card, nor obstruct the children's view.

"7 *Tests of vision — to be applied to children 7 years of age or older.* *a* Children having glasses should be tested with their glasses properly adjusted to their faces. If necessary they should be sent to an expert for a fitting before the test is made. They should then be tested *without* their glasses and the results of the two tests should be carefully compared to ascertain the degree of relief afforded by the glasses.

"*b* Children who are under the care of physicians must have these tests made and recorded the same as those who have no regular medical care.

"*c* Seat the children 20 feet in front of the Snellen chart. See that the chart is well illuminated, as described in section 6, and that the child's eyes are on a level with the 20-foot line.

"Instruct the child to cover the left eye with clean screen (heavy cardboard is good) held against the nose. Do not allow the child to cover the eye with the hand or make any pressure whatever on the eyeball, as it will interfere with the test of the left eye later on.

"Ask the child to read the letters aloud, in regular order, beginning with the top line. Make a note of the smallest line that he reads with no more than three errors in naming the letters.

"In the same manner ask the child to cover the right eye and name the letters from the top line to the bottom, in the reverse order — from right to left. This is done to prevent the child repeating the letters from memory. Notes the smallest line that he reads with the left eye, with three errors or less.

"*d* Use of 'inverted E's.' For the child who does not know all the letters, 'inverted E's' are included in every line of the

card. The child should be instructed to indicate by his extended fingers the position of the E as pointed out by the examiner. In other words, the child holds his open hand with the fingers pointing up, down, right or left, as in the character pointed out.

"It is well to have a large letter E cut from cardboard or sheet metal which the child can hold to represent the position of the letter pointed out by the teacher. Note the lowest line in which he sees the E's with not more than three errors.

"*e* Memorizing. If it is suspected that the answers are being made from memory a hole about one and one-half inches square may be cut in a strip of cardboard so as to allow only one or two letters to show through the hole, and by skipping around rapidly it is easy to break up the memorizing of the letters. This method may be of use also in testing little children. (See 7 *f*.)

"*f* Record of distant vision. The letters of Snellen's Test Type are standardized for certain distances from the normal eyes. Thus, the letters marked 100 are readily distinguishable by the normal eye at a distance of 100 feet; those marked 40, 30, 20, etc., are each distinguished normally at the corresponding number of feet from the observer.

"The child's visual power is rated by a fraction, of which the numerator is his distance from the test letters — in this case 20 feet. The denominator of the fraction is the number belonging to the smallest line of letters that he reads without more than three errors. If he reads the 20-foot line passably with the right eye his vision is recorded as R 20/20. If he fails on the 20-foot and 30-foot lines and reads the 40-foot line his vision is R 20/40.

"When the child fails on all the lines he should go nearer the chart, say 10 feet, and try the test as before. The numerator of his fraction will then be 10, and he may be rated as R 10/100 or R 10/70, etc. When the child takes a position nearer than 20 feet, he should be tested on several lines, and not on the same line only, with each change of position.

"Be sure to measure carefully the child's distance from the chart. "Pacing" the distance or estimating it in any other way is absolutely inexcusable, because liable to be very inaccurate.

"Remember that if the vision of one eye is poorer than that of the other eye, it may be due to pressure on the eye from the hand

that covers it. Do not allow either eye to be pressed upon while the other is being tested!

"When a child reads the letters correctly, but very slowly, or with much hesitation the fact should be noted by the teacher, and an explanation should be found if possible. The teacher should also observe and record the child's posture and general attitude. The position of the head, and the expression of the face may be positive evidence of eyestrain.

"Little children often transpose the letters in reading This is a peculiarity of child psychology and has nothing to do with the rating of the vision. The use of the cardboard aperture, described in 7 *e*, will prevent transposition.

"8 *Notification of parents and guardians.* When the visual power is 20/30 or less, for one eye or both, the child should be referred to a specialist for further diagnosis and advice. The same course should be followed if the child's condition suggests eyestrain or eye disease.

"If a child wearing glasses fails to do well with the tests of vision, or if his glasses do not seem fully to relieve his disability he should be referred to a specialist, who should certify that the child has received the necessary attention.

"*Testing of hearing — for children of all ages.*

"*a Directions for testing.* The room in which these tests are given should be not less than 25 or 30 feet long and as quiet as any that can be found. The windows and doors should be closed. The floor should be ruled with parallel lines one foot apart and the child should sit in a revolving chair on the first line. No other pupils should be in the room during the test. The examiner should be a person of normal hearing, as determined by the test, and should stand at a measured distance of 20 feet from the child. There should be nothing back of the examiner that could act as a sounding board — such as a door or a vibrating wall.

"Before making these tests the examiner should ascertain, by practice with persons of normal hearing, how to regulate the whispered or low-spoken voice so that it will be heard plainly at a distance of not more than 25 feet.

"The child should be instructed to turn the right ear towards the examiner, and to place the finger in the left ear firmly enough

to prevent hearing. He should be told to listen attentively, *with his eyes closed* and to repeat the numbers that the examiner whispers to him.

"The examiner then pronounces a number of two or more syllables, such as "fifty-four," in a whispered or low-spoken voice of moderate intensity. The child will repeat correctly three out of five such numbers if his hearing is normal. If not, the examiner moves a foot or two nearer and pronounces another series of five numbers, keeping up this procedure until the child hears distinctly three or more of the five numbers. The examiner notes the distance at which the right ear hears distinctly, and then tests the left ear in the same manner.

"It is important not to correct the child's responses to the test but to proceed as though all the results were favorable. The examiner should also aim to maintain the same quality and volume of voice throughout the tests and to pronounce the syllables with equal emphasis, speaking deliberately and distinctly. For this reason it is best that the same examiner should test the entire school in order that the results may be impartial.

"*b Record of hearing tests.* The record is made in the form of a fraction, having for its denominator the distance at which the whisper is audible by the normal ear, that is 20 feet, and for the numerator the actual distance at which the child hears well. If the child's right ear hears normally, or at 20 feet, his record is R 20/20. If with his left ear he hears the test words at a distance of only 8 feet his record is L 8/20.

"*c Alternative methods.* A child who is too young, careless or inattentive to respond fairly to the whispered numbers may be placed with his back to the examiner at a distance of 20 feet and told to close one ear as in the preceding directions. The examiner then whispers an order such as: 'Hold up your right hand,' or 'Open the door.' The greatest distance at which the whispered order is carried out is used as numerator of the hearing record for the ear undergoing the test.

"*d Form of permanent record.* The school blank form is designed to record the results of the hearing tests.

"*Notification and follow-up work.* Any impairment of the hearing, however slight, is a serious menace to the future well-

being of the child. Deafness is often of slow and gradual development and the merest suspicion of its onset ought to be the signal for expert medical examination and treatment. For these reasons the teacher is urged to notify the parent or guardian when the child does not give a satisfactory response to the tests for hearing. Any unsatisfactory answers to the questions in sections 4 and 5 should also be regarded as sufficient ground for asking parents or guardians to seek medical counsel for the child in order to prevent more serious ear trouble in the future.

"*Importance of prompt relief of defects of eyes and ears.* The child's eye, like the rest of his body, lacks the strength and endurance of the adult's. The child's eye is readily deformed and drawn out of shape by a stress or strain that would easily be endured by the adult's. Every physician learns from observation that the eye troubles of a child are likely to grow worse unless the eyes are properly relieved by making their work easier or by the use of glasses.

"'Squint eye,' 'cross-eyes,' or strabismus, if beginning early may progress until, at the age of 10 years, unequal traction on the delicate eye muscles has changed a pretty face into a pathetic caricature and greatly reduced the visual power.

"'Near-sighted' or myopic eyes tend to become worse instead of better, and by constant distortion of the eyeballs may end in partial blindness.

"It is a costly mistake to assume that the school child will 'outgrow' any defect of vision. The truth is that defects usually grow more numerous and more serious as the child grows older. Eyestrain is likely to develop near-sightedness and this leads to impairment of vision. 'Cross-eyed' children grow into 'cross-eyed' men and women and often suffer from the weakening of one or both eyes. Inflammatory diseases of the eyes, as a rule, tend to become chronic or more disabling unless promptly treated.

"Every school child with signs of any of these defects, and every child annoyed by dizziness, nervousness, headaches, 'seeing double,' styes or other troubles traceable to eyestrain should have the services of an expert in diagnosis and treatment of eye disorders; and under no conditions should the examination and treatment of the eyes be postponed until 'a more convenient season.'

"It is equally important to attend promptly to every child whose hearing is impared. Defects of hearing are liable to grow more serious with age. The child hears less and less of what is going on around him and profits less from the school and from human intercourse in general. There is no other physical defect that retards the child's progress in school so hopelessly as defective hearing, without adequate relief.

"Every case of suspected adenoids or enlarged tonsils and every case of mouth breathing should have prompt examination and treatment by a competent physician. Neglect of these conditions may lead to the development of serious complications in the ear, the mastoid cells and other adjacent structures. Frequently recurring nasal catarrh also should have thorough treatment because it is liable to extend from the nose through the connecting channels to the middle ear, where it may cause abscess or chronic inflammatory disease, and deafness.

"Excessive accumulations of wax in the ear may cause distress or deafness. Although it may seem easy to remove wax from the ear, this should not be attempted by an inexperienced person as serious damage might be done to the ear drum."

Education of the Blind Child

All blind persons of suitable age and capacity for instruction who are legal residents of the State of New York are entitled to education without charge in the State School For the Blind. The application for admission should be made to the board of trustees of the State School. Paragraph 993 of the Education Law directs that the application be accompanied by a certificate from the county judge or county clerk or the supervisor or clerk of the town or the mayor of the city where the child resides "setting forth that the applicant is a legal resident of the town, county and state claimed as his residence."

The Deaf Child

If a deaf mute under the age of 12 years becomes or is in danger of becoming a public charge the public health nurse should apply to the local overseer of the poor or commissioner

of charity or to the town supervisor, or if in a city to the ward supervisor to have the child placed in a state institution for education. The law is mandatory that all such children shall upon application be provided for. Their maintenance is a charge upon the county. The State Board of Charities should also be informed of the case.

ORTHOPEDIC DEFECTS

These defects are probably much more prevalent than is generally believed. Miss Jessie Bancroft, Assistant Director of Physical Training in the public schools of New York City estimates that "probably 80 per cent of so-called normal children have antero-posterior faults of posture." She also estimates "that 85 per cent of the time spent in school calls necessarily for positions, the influence of which is toward poor posture, that the balance of 15 per cent is vitiated in its possible influence by poor furniture, poor light, fatigue, physical defects, etc., and that only 11 per cent of the time (physical training and singing) makes actively for good posture." *

Dr. Lloyd T. Brown in the examination of 700 school children in the Boston public schools found three-fourths of the children in bad posture, one-third of the boys and three-fifths of the girls had faulty weight bearing foot posture. The tendency to bad posture increased as the children advanced to higher grades, while in the high school "bad posture was nearly twice as common as good posture." "There is reason to believe that faulty use of the body has a definite relation to faulty use of the feet. This should be a very important point in the care and hygiene of our school children." †

‡ Dr. Hills Cole at the Fourth International Congress on School Hygiene said: "We must conclude that foot strain in school children is more common than eye strain, and its effects are just as serious. It is caused by the muscular effort involved in

* Report of Transactions of Fourth International Congress on School Hygiene, Vol. IV.

† Report of Transactions of Fourth International Congress on School Hygiene, Vol. V.

‡ Weak Ankles, Flat Foot, Spinal Curvature in School Children, by Hills Cole, M. D., Monthly Bulletin of State Department of Health, October, 1913.

balancing the weight of the body in a shoe, the bottom of which is smaller than the bottom of the foot. If the foundation of a school building did not come out as far as the side walls the pupils would be constantly menaced by the liability of the structure to collapse. A weak ankle or flat foot is a foot that has rolled inward over the shoe bottom because the strain on the muscles whose function it is to hold up the inner arched border of the foot has caused them to lose their grip and to let the weight of the body rotate the foot inward and downward.

"Foot strain is also a matter of vital moment to the school teacher.

"If the foot rolls inward under the body weight unnatural pressure is brought on the side of the great toe joint, and a 'bunion' is produced.

"If the toes are cramped in shoes, the muscles of the foot can not act freely and strain is put upon the other muscles in the effort of walking.

"If the shoes are made on a twisted last, walking is more of an effort than it should be. High-heeled shoes throw undue weight on the ball of the foot, and at the same time make the foundation upon which the weight of the body has to be borne less secure; each defect involves muscle strain in the endeavor to minimize its effects.

"Rolling of the foot interferes with the circulation in the foot and leads to swelling, which fills up the hollow of the arch and adds to the appearance of flatness.

"In addition to these primary effects, we have secondarily a natural diminution of the general efficiency of the sufferer from foot strain. If the feet are demanding more than their share of the body's output of nerve force or vital energy, some other part, or the body as a whole, must get less than its share. If there is any foot suffering for the mind to dwell upon, the pupil or teacher, as the case may be, must give less attention to the lessons; and the demands of the modern school curriculum are surely exacting enough to call for all the vital energy pupil or teacher possesses.

"For the prevention of or relief from weak ankles or flat foot, a shoe must be worn in which the body weight is properly dis-

tributed, and with a bottom so planned that the foot has no tendency to roll over it. It is not sufficient to give plenty of room for the toes; it should be a straight shoe to conform to the natural axis of the foot; a firm sole gives stability to the foundation without necessarily interfering with muscle action; but above all, the rear half of the shoe must be right as this is the most important part since it receives the body weight; the shank between the sole and heel should be short and wide and so placed on the shoe as to meet all the lines of weight thrust, forward and lateral extension of the heel being employed for this purpose.

" Too much care can not be given to the correct shoeing of children, not only for the sake of conserving the health and happiness of the child, but also with an eye to the future that there may be no crippling of the feet in any degree to act as a bar to progress during the later productive years of life.

"As to the spinal curvatures dependent upon foot weakness, if pronation of the foot is prevented by a shoe constructed along the lines indicated, the curvature will gradually correct itself. When the foundation is scientifically constructed, the superstructure is plumb."

Many parents believe their children will with increasing years outgrow these childhood defects, and therefore neglect to care for them. Instead of outgrowing them only too frequently the result is a general systemic disturbance which still further incapacitates the child in the general competition for a place among his fellows.

Since faulty posture and spinal deformity are frequently caused by general muscular weakness due to faulty nutrition or unhygienic home conditions, the nurse will need not only to strive to prevent the development of these defects but to participate in the work of securing their correction. To accomplish this the dietary of the child will require her attention.

MALNUTRITION

To correct faulty nutrition of the child frequently involves changing the food habits of the entire family. Many of the children may be taught good habits through nutrition classes in the school; for others intensive home work will be needed before

progress will be made. Sometimes the mother will need to be induced to change the disposition of the entire family income before the diet will be adapted to the needs of the different members of the household. This may sometimes be accomplished through neighborhood classes; sometimes it calls for individual instruction in the home, and a good knowledge of budget making. It will be necessary to consider what the local market offers, and what the family income is. A good deal of enthusiastic competition may be developed among the mothers or possibly the older girls of the family in preparing desirable dishes or bringing the children up to the standard. It is important that the nurse should understand that nutrition is intimately involved with other matters of personal health, such as good teeth, vision, hearing, posture, and even with mentality, and that with nutritional improvement she may look to find other defects tending toward correction. Much good literature is available for guidance in this field, and the New York State Department of Education has special instructors who are supervising the development of methods in all public schools of the State. Parent-Teacher Associations will frequently take over the ways and means of securing funds for demonstration. The Junior Red Cross is an invaluable ally in helping to "get things across," particularly the things which make for healthier boyhood and girlhood.

Any child 10 per cent or more underweight should be placed in the nutrition class.

After-Care of Infantile Paralysis

In addition to the minor orthopedic defects cited in the preceding section, there are found in nearly every community of the state children and adults who are seriously lame or deformed, and who are going about with a twisted contorted gait or with the aid of crutches, or who may even be confined to a wheel chair.

The majority of these cases have resulted from the effects of poliomyelitis (infantile paralysis) where there has been no treatment or the treatment was inefficient or not continued sufficiently long. A few of the cases are beyond all help, but the majority can be greatly benefited by hospital care, operations and proper apparatus and can thus be restored to school life or enabled to

earn a partial or complete livelihood. The State Department of Health employs an orthopedic surgeon and a staff of specially trained nurses, each in charge of a district, who are at the service of any community free of charge. Should a nurse discover any cases of infantile paralysis or after effects of that disease, which are not receiving medical or surgical attention, she should report to the local health officer or school inspector, or directly to the State Department of Health, and the services of the orthopedic surgeon and the state nurse will be promptly given. Nurses not specially trained in the management of such cases should not undertake their supervision until they have received instructions in each case from experts.

"SUGGESTED DUTIES OF THE SCHOOL NURSE *

"1 To assist the medical inspector or teacher in examining children and in keeping records.

2 To visit the homes of those needing treatment and to urge its necessity on the parents.

3 To watch for any evidence of contagious diseases or conditions in the school, and when found to notify superintendent, principal, teacher, or medical inspector.

4 To detect and refer to the family physician, medical inspector or dentist any evidence of eye, ear, nose, or throat trouble or other physical or mental defects.

5 To render first aid in emergency cases occurring in schools and to see that child is taken either to its home or to the family physician.

6 To report to the superintendent of schools or principal any error she may detect as to light, heat, and ventilation in the schools, or any improper seating or other insanitary conditions.

7 To follow up absentees occasioned by medical inspection, or where contagious diseases or conditions may be suspected.

8 To follow up recommendations of family physicians, dentist, or medical inspector, and to inform the superintendent of schools or principal of results obtained.

9 To accompany children in special cases with written permission of parent or guardian, to hospital, dispensary, family

* Prepared by the State Medical Inspector of Schools.

physician, oculist, or dentist, and to secure from such a report as to services rendered to pupils.

10 To investigate and improve home conditions where necessary by instructing children and parents in matters of personal and home hygiene and to bring home and school closer together.

11 To investigate reasons for truancy and to do whatever may be possible to remove home causes.

12 To keep employers and parents informed regarding child labor, compulsory attendance, medical inspection, vaccination and other laws bearing upon the health of the school child.

13 To cooperate with physicians, dentists, school authorities and others in better conserving the health of the child and improving its environment, both at home and at school.

14 To perform such other duties as may from time to time be prescribed by the board of education or by the medical inspector."

Physical Education

The New York State law making physical education compulsory for all pupils, male and female, eight years of age and over in public, private and parochial schools was enacted in 1916. An average of at least twenty minutes a day throughout the school year is required for the subject. The result of this has been the development of a syllabus in physical education which has for its objective the offering of such stimulation to the potential capacity in the child for muscular activity as will "contribute to the development of bodily vigor and endurance, muscular strength and skill, bodily and mental poise, and the social and moral qualities of courage, self-control, self-subordination, cooperation under leadership and disciplined initiative." Drills, games, sports, athletics, romps and gambols have become a coordinate part of school activities, among which exercises specially designed to correct existing physical defects have been introduced as their need has been indicated.

This introduction of a physical education program as a component part of general education is having a far reaching effect upon training for citizenship. Nowhere is this more apparent than among industrial and commercial forces. A positive appeal has been made to be permitted to be born fit and

to remain fit, to know the joys of life of the free-born and to spread the contagion of happiness that grows through successful endeavor. The response to that appeal has been to motivate health conservation. Rural people, always at first somewhat conservative to new doctrines, are gradually responding to the appeal. The big factor in so presenting the subject that it will secure immediate and hearthy response is the application of the principles of psychology to the teaching of health conservation.

The vital principle governing the method is to make the subject look so attractive that children will be so eager to possess it that they will run after it and be willing to even make personal sacrifice to have it for their own enjoyment. It is practically identical with business methods in salesmanship involving good advertising. By this method passive receptivity is transformed into personal initiative, enthusiasm is aroused, teams are organized for contest and competition; in short, health conservation becomes good sport. It was the physical inaction of former methods of teaching hygiene which made it so irksome; learning from books is dull business for children until they want some definite information and are directed to a book where they can find the thing they are looking for to apply to some situation in which they are interested.

This sort of presentation of the subject requires good teachers; the demand for this type of teacher has exceeded the supply and is increasing. To get the community's children critically to look over themselves, their homes, and their neighborhoods and to score themselves and each other according to a scale upon the merits of which they have previously passed judgment, to have them score their wells, privies, barns, and other indispensable requirements and compare results with each other, to have them take up the matter of making a higher score on any matter from underweight or dirty teeth to a better system of lighting, heating and ventilating the school house calls for leadership in which teachers admit they receive from their pupils as much as they give. This frank comradeship in action is what makes this sort of teaching a success, be the pupils children or adults. Dead methods of teaching health subjects are being discarded as rapidly as teachers can be trained in the better way. It is not too much

to hope that with this new broad avenue opened in public health education not only teachers of physical education, but all students of public health, will be instructed in the psychologic method of approach, or as some prefer to call it, this art of advertising and selling health.

The general plan for physical education for schools in the State as adopted by the State Department of Education is as follows:

"First: (1) Individual health examination and personal health instruction (medical inspection);

(2) Instruction concerning the care of the body and concerning the important facts of hygiene (recitations in hygiene);

(3) Physical exercise as a health habit, including gymnasium, elementary marching, and organized, supervised play, recreation and athletics.

"Second: (1) That the class teacher assist in the individual health examination and personal health instruction of pupils through

(a) Rapid inspection of all pupils at the beginning of each day's session;

(b) Reference to the proper authority of all children showing need of personal examination and advice;

(c) Appropriate exercise and recreational provision for all pupils reported by the medical inspection as organically unfitted for regular physical exercise;

(d) The following up of all health advice that can be followed up. This assistance from the regular class teacher is not to take the place of the work of the medical inspector or school nurse.

"Third: (1) That class instruction concerning the care of the body and the important facts facts of hygiene be given by the class teacher, except in schools in which special teachers are appointed;

"(2) That the syllabus on physiology include such subjects as the following:

(a) General —

1 Hygiene of the teacher
2 Sanitation of the school room and playground
3 Hygiene of the janitor
4 The use of pupils as 'health officers' or 'sanitary inspectors'

(b) Syllabus for elementary grades, the general topics being cleanliness, position, cheerfulness, care of the skin, care of digestion, care of the muscles, care of the eyes, care of the ears, nose, and throat, care of the teeth, care of the heart and circulation, care of the lungs, care of the nervous system.

"Fourth: (1) That the instruction in physical exercise include practice in such activities as gymnastics, marching, play, recreational exercise, and athletics, and that reasonable and approximately equivalent activities in the home or community life of the child be accepted as substitutes of this requirement."

(The syllabus for Physical Training may be had on application to the State Department of Education.)

PHYSICAL EDUCATION IN PART-TIME SCHOOLS

The recently enacted law creating part-time schools in communities of 5,000 inhabitants or over, to be administered by local boards of education, will insure to all boys and girls between the ages of 14 and 18 years who have discontinued attendance for full-time instruction, a continuation of this invigorating influence. This new law creating part-time schools with state and federal aid is carrying physical education into the heart of agricultural and industrial communities. The administration of the law assures cooperation between agricultural and industrial interests, pros-

pective workers and local education forces in the 103 districts in which the law will become operative in the autumn of 1920. The annual requirement is not less than four and not more than eight hours weekly during 36 weeks of each year, the sessions to be held on regular school days between the hours of 8 A. M. and 5 P. M. It is intended that not less than one-eighth of the time shall be given to physical education and hygiene. The type of schools to be established under this law includes general industrial schools, unit-trade schools, schools of agriculture and schools in practical arts and home-making. To these are added evening schools for male or female pupils over 16 years of age which "shall provide instruction in subjects related to the practical work carried on in such employment." All persons, firms or corporations employing minors between 14 and 18 years of age are required to permit such children to attend these schools. Recent surveys made by the Division of Agricultural and Industrial Education indicate that manufacturers are ready to participate to the fullest extent in making this work fit the community need.

Salesmanship Methods for Health

In actual practice it has been found that the same form of health education which appeals to children, viz., health as a by-product of games, sports and athletics, is the one which appeals to their elders. A group of Austrians in a central New York village watched the physical director of the gymnasium of the industry employing such methods as he coached fellow-workmen at baseball. Upon his invitation to them to come and take part in a game they seemed a bit confused, but tried the game, changed their efforts to something else, finally developed an interest in basket ball and made up a team of Austrians. They spoke practically no English at first, but learned to use a little English while learning the game. One evening after play they proposed to the director that he should go to their homes evenings and teach them how to speak and read English "like Americans read." The director accepted the invitation and the first Americanization class in that part of the state was begun as a by-product of the gymnasium.

In the same way good health habits regarding food have been taught in the cafeteria of an industry. "Taste this pudding

before you swallow it; if you like it keep tasting before swallowing; we will make things that you like to taste before swallowing if you will tell us what they are" printed on a card and served with a pudding produces a more satisfactory reaction than an appeal not to bolt the food. By such methods health habits are being established among working people. The cafeteria creates a demand for good food; the athletic program establishes habits which eliminate the waste products; the clubs train in citizenship and self-government; the factory personnel enjoys life and spreads the contagion of happiness resulting from good habits. No negative appeal through fear of malnutrition, pasty faces and defective bodies would ever get the hearing which this sort of appeal secures.

A country physician near Lake Ontario found a neighbor's motherless daughter, a girl of 16 years, with tuberculosis. He set about stimulating in her a longing for a Ford runabout and then induced her father to buy it for her, saying nothing to either of them about her disease as her mother and only brother had died of it. The girl in her runabout soon became the most familiar object in that countryside. Before summer came roses were in her cheeks, she had taken on weight, and a year after the former examination the physician could detect none of the previous dreaded symptoms.

Cooperation in Physical Education and Health Supervision

The response of the public to this development of health through play activities, and the fact that "the 50,000 teachers in the public schools are every one expected to take some part in physical education," has led to special courses in health work for normal school students. If health for everybody could be captured with a butterfly net, the situation would be simplified. But the fact still remains that not all children are physically fit for even normal play activities. For this reason the school medical inspection must take place before physical training begins. Teachers are expected at all times to refer to the medical authority all children who appear to present a departure from the normal. The medical inspector is expected "to establish the limitations within which such child may exercise." Corrective exercises are developed to meet individual needs.

CHAPTER XVII

Mental Hygiene

In general little time or opportunity has been given in the training of nurses for instruction and supervision in mental hygiene. Few hospitals provide, even temporarily, for those who are mentally ill. Most hospitals provide only medical, surgical and obstetrical care for acute or subacute cases. The tuberculous, too often considered hopeless, have been frequently permitted to die without care. The feeble-minded, epileptic and insane have been hidden in many instances from public notice, and in the last extremity have been confined in the almshouse or jail. The reason for this has doubtless been the lack of beds and facilities and because while speedy visible results follow medical, surgical and obstetric care, results from the treatment of tuberculous and mental instability require many weeks or months. The public is beginning to understand that tendencies to theft, arson and murder may be recognized early, the thoughts of these persons diverted into other and normal channels and crime be prevented. Perhaps less generally understood is the fact that much insanity may be prevented if school medical inspectors, health officers and public nurses are familiar with the early symptoms indicating mental instability, and if cases with predisposition to psychosis and psychoneurosis be given suitable early training and treatment. To the public health nurse, whether serving a board of health, a board of education, or however employed, will often fall the duty and opportunity to prevent disaster to the individual and society by securing early clinic treatment for this class of cases. Unfortunate heredity, abnormal surroundings in childhood, intoxication by alcohol and other poisons during the formative age, are predisposing causes of mental disorder.

Dr. William Burnham * of Clark University has named as *characteristics of the sane mind* the following:

1 Ability to give attention to the present situation;

2 Orderly association of ideas;

* Transactions of the Fifteenth International Congress on Hygiene and Demography.

3 Normal reaction to feeling and emotion
(a) first physical,
(b) secondary associated psychic;
4 Inclination to proper alternation of periods of work and rest;

Conversely the following symptoms are characteristic of disordered mentality:

1 Inability to attend to a present situation;
2 Inability to associate ideas;
3 Failure in appropriate feeling or emotion, reaction, or in psychic adjustment controlling physical reaction;
4 Absence of disposition to alternate periods of effort and relaxation.

Dr. Franklin E. Williams * of the Massachusetts Society for Mental Hygiene calls attention to two types of personality which are found frequently among those who develop insanity of adolescence and which may be recognized during the school period:

(a) the precocious restless type, feverishly pursuing knowledge and the accumulation of facts which they gather but fail to utilize;

(b) the reticent unsocial type, faddish about such details as food, bath and exercise, irritable without cause, and sullen when opposed.

Through health supervision of children and adults who show these and other symptoms of disordered minds, through cooperation with educational and other State authorities, much may be accomplished in the prevention of insanity. The personal initiative and resourcefulness of the public health nurse will be the determining factors in many instances of the degree to which disaster threatening persons in this class will be obviated. Such persons should be taken or sent to the free clinics in mental hygiene which are maintained in nearly every district of the State in connection with the State hospitals. The local public health nurse should write to the State hospital for her district, or to the State Hospital Commission for information concerning the location of these clinics and the name and address of their field agents. These clinics and field agents for promoting mental hygiene have comparatively recently been greatly increased and

* Transactions of the Fifteenth International Congress on Hygiene and Demography.

more generally employed. They meet a great need in the field of preventive medicine.

The Mental Defective

In studies conducted by the Research Department of the Training School for Mental Defectives at Vineland, New Jersey, 5 per cent of the children in the first five grades in school were found defective, and 15 per cent proved to be backward. (Many cases of backwardness may be remedied by removal of hypertrophied and diseased tonsils, and adenoids, and by treatment of defective hearing, anemia and rickets.*) Rural surveys made by nurses from the State Department of Health have shown in every community the presence of mental defectives. In certain isolated school districts the majority of the pupils are of low grade mentality. In one district with 135 school children in 7 schools a test of their mentality showed 6 feeble-minded and 2 epileptic. In one township with a population of 1,127 there were found 5 epileptics one of whom is an imbecile and 29 feeble-minded persons.

Defective mentality is directly responsible for an incalculable amount of poverty, vice (including alcoholism and venereal disease) and crime. The public through State, municipal or private funds must pay the price of this condition. Frequently the payment is made through destruction of property and economic waste. Statesmen, educators, and other social agents are seeking to give adequate care and supervision to this class of persons. Adequate care involves educational supervision, and training with custodial care when necessary; and through colonization, prevention of reproduction of their kind, while allowing the largest possible amount of individual freedom and usefulness. To accomplish this several State institutions have been created for epileptics, misdemeanants, delinquents and other children and adults of defective mentality. The school nurse should cooperate with local agencies to secure the fullest possible education of these children, bearing in mind, however, that since defective mentality is incurable, the nurse's work generally will not only be economically more efficient, but also produce a better citizenship if permanent custodial care can be provided for these unfortunate

* Dr. H. H. Drysdale, Cleveland Medical Journal, Vol. IV, No. X.

persons. It costs the State less than $175 per year to care adequately for its mental defectives. What it costs to care for them inefficiently in the home can not be computed, the toll being exacted not only in cash, but also in suffering in which those not mentally defective are also involved.

Paragraph 68, State Charities Law, provides that feeble-minded children may be received into a State institution for the feeble-minded upon the official application of a county superintendent of the poor or the commissioner of charity of a city, and that in such admissions preference shall be given to indigent children.

Paragraph 94, Art. 7 of the State Charities Law provides that " superintendents of the poor of the various counties of the state may commit to an asylum for the custody, maintenance, training and treatment of such persons " if vacancies exist therein, feeble-minded persons and idiots in their respective counties. Insane idiots and epileptics are, however, sent to insane hospitals. The maintenance of all such persons becomes a charge upon the State if the parents or guardians are unable to pay for same.

Paragraph 461, Art. 22 of the State Charities Law provides that " on application of a parent, guardian, friend, or relative, or of any poor law official, or of any probation or parole officer, or of any superintendent or principal of schools," it shall be the duty of the judge of a court of record to set a date of hearing to determine the mental status of the alleged feeble-minded child. If it appears to the judge that it is to the best interest of the individual and the community that the person shall be committed to a public institution for the care of such persons the judge may make the commitment.

The State Commission for the Feeble-minded, the State Board of Charities or the State Charities Aid Association should be called upon for advice whenever the nurse does not know how to proceed in dealing with this class of defect. Many counties have Agents for Dependent Children and Children's Aid Societies to handle such cases.

Often tuberculous children and parents are also defective mentally. The tuberculous condition should not be the one first considered in such cases, for expense involved in caring for these children in open air schools is often wasted, the children relapsing

within a few weeks after returning to their homes. In all such cases from a purely economic standpoint, and surely for the permanent welfare of the child, counsel should be sought from a psychiatrist, and every effort made to induce parents to consent to the treatment prescribed. There is a State Colony for the Care of Epileptics. Any moral pervert, habitual plotter of mischief, or otherwise delinquent child should be regarded by the nurse as probably mentally defective, and should be taken to a psychiatrist for examination. The counsel of the State Medical School Inspector of the State Department of Education, or of the New York State Commission for the Feeble-minded, should be sought if a proper examination for diagnosis can not be locally provided.

Quite frequently there will come to the attention of the public health nurse instances where minors who have been in special classes for the subnormal have left school at the earliest allowable date, and lacking the guidance which they had in school, they have drifted into back eddies of the community, there to be a source of positive harm to others. The fact that at the present time there is inadequate institutional space provided for these unfortunate children should not deter the nurse from taking up each case with the State Commission for the Feeble-minded. Frequently provision can be made to safeguard the child and the public. Moreover adequate provision can not be expected if actual needs for care of this class of persons are not known.

CHAPTER XVIII
Hygiene of Home and Workshop

To improve the immediate environment of persons in their homes and places of daily occupation is one of the most important objects of sanitary supervision. Bad housing conditions, overcrowding, filthy and dirty habits, and lack of proper light and ventilation, reduce individual resistance and thus favor the transmission of all kinds of communicable disease, especially tuberculosis. At the same time improvement of such conditions is often one of the most difficult problems which health authorities have to meet, because they are interwoven not only with established structural defects in buildings, but also with confirmed habits of living and indifference of the people themselves. Hence this problem will require for its solution a persistent campaign of popular education, the result of which, while far reaching in its effects, must necessarily be slow.

HOUSING

The term "housing" broadly considered, properly includes all conditions in ordinary dwelling houses, in factories, schools, public buildings, and structures of all kinds; but it is usually applied more particularly to dwelling houses and the conditions found inside of the home in contradistinction to conditions outside of or surrounding the dwelling.

In dealing with housing conditions such questions are to be considered as the hygiene of the home, — how people live, whether in a cleanly or uncleanly manner; the size of the dwelling quarters and the number of people occupying a room; whether the house is out of repair or lacks windows; and whether it has proper heating facilities, protection against fire, etc. In all these conditions the public health nurse can do a great deal through helping to raise the standard of living by means of popular instructions in the home. The following are the chief unhygienic conditions to be observed:

1 *Overcrowding.* Overcrowding offers increased opportunities for transmission of disease by direct contact and favors uncleanli-

ness, bad ventilation and other factors which are conducive to indirect transmission of infection. Community congestion, or the overcrowding of dwellings on a limited area of land, as with tenement houses, cuts off light and air, and leads to other disadvantageous conditions. Family congestion, or room overcrowding, is more important in its effect upon health. The size of rooms for dwellings is somewhat of an economic question and its regulation is an exceedingly difficult administrative problem, but health authorities have a clear duty to perform in restricting the number of persons who may occupy a certain air space, in making regulations regarding the construction of new buldings and in requiring necessary alterations of old ones. Theoretically, the rooms should be large enough to allow the air to be replaced two or three times an hour without causing perceptible drafts. This would require a minimal air space of from 700 to 1,000 cubic feet per person. Very few rooms in ordinary dwelling houses, however, are found with more than 600 cubic feet of air space per person, and many with scarcely half as much as this. But however large the space may be, the air will become impure unless fresh air is allowed to circulate, and however small the space the air may be kept reasonably pure by sufficient circulation. Movement of the air is therefore of greater importance than the size of the room.

2 *Uncleanliness.* Uncleanliness is even more undesirable than overcrowding as a factor in disseminating disease by direct contact. Moreover, both directly and through their physiological action, personal uncleanliness and unclean conditions in themselves undoubtedly exert a depressing effect on human beings, especially upon children and sensitive or delicate adults and thus also act as contributing causes of disease.

3 *Lack of proper ventilation, light, etc.* Under this head may be included a number of remaining conditions referring chiefly to ventilation. The lack of light has more of an indirect than a direct effect in favoring uncleanliness; darkness being usually associated with dirt, dampness, and faulty ventilation. Light is for this reason as necessary to health as cleanliness and fresh air. Light, especially direct sunlight, is a valuable germicide. A room or dwelling into which the sun never shines can not be health-

ful and those who inhabit dark, damp apartments soon become pale and sickly, like plants that are kept in a cellar.

A dwelling in need of repair is not always an indication of poverty, but is often evidence of the low standard of living of its occupants. Such houses are not infrequently centers of disease and infection.

4 *Plumbing inspection.* Modern sanitary science does not place much importance upon plumbing inspection from the health standpoint except insofar as it relates to human excreta. Sewer gas, once a hygienic bugaboo, is no longer considered really dangerous, however disagreeable its odors may be. Nevertheless, such odors should not exist as they are usually an evidence of imperfect plumbing fixtures. The public health nurse should therefore look for any evidences of leakage around such fixtures, and should note general conditions and whether proper provision is made for the disposal of the wastes.

5 *Types of dwellings.* The principal types of dwellings are:

(1) The one-family house, which is the ideal dwelling from a sanitary point of view, especially if built detached.

(2) The two-family house, of which there are two kinds: (a) the double house with a party wall or division in the middle, with separate entrances on each side, each family occupying one-half the house; (b) the double house in which one family occupies the ground floor and possibly the basement, and another family occupies a second and sometimes a third floor, with separate entrances for each family. Such dwellings may be quite as satisfactory from a sanitary standpoint as one-family houses.

(3) Tenement houses. Dwellings are usually classed as tenement houses when more than two families live independently but share common stairs or hallways. The tenement house exists in all large cities in this country. The suburban dwelling may eventually be so developed and cheapened in some localities as to do away, partially at least, with the great demand for tenements. Tenement houses, however, should be under the control of health and housing authorities, (like the Tenement House Commission in this State) which should regulate their construction and care, and the building of new tenements should be discouraged in those places when there is no economic need for their existence.

The housing problem, however, is not confined to any one type of dwelling. The conditions found in houses technically classed as one or two-family houses, are often quite as bad as those found in tenements. These conditions may be due to faulty construction or care by the landlord, or to the crowding of more than one family into a "one-family" house, or to more than two families into a "two-family" house (especially in growing industrial communities). There is the lodger problem to contend with everywhere in all types of dwellings.

(4) Public buildings. Public buildings such as schools, churches, theatres, moving picture shows, factories and workshops, public baths, court houses and other municipal and state buildings, require attention chiefly in relation to cleanliness, lighting and ventilation. Of these ventilation is the most important, for in buildings of this class proper ventilation is the exception rather than the rule. Owing to the fact that great numbers of people spend many hours of each day in such places, this is a distinctly important field of work for the public health nurse and for other public health inspectors.

Ventilation

Ventilation is commonly supposed to be a very simple matter, viz., to furnish a continuous stream of fresh air from the atmosphere outside of the house to replace that which is constantly being vitiated inside. But to do this under the artificial conditions in which people live and work is often extremely difficult, if not sometimes impossible.

Ventilation to be satisfactory must serve a number of purposes and comply with a number of conditions: (1) It must bring pure air from without in order to dilute the products of respiration as well as the other sources of vitiation; (2) it must maintain the air within the room at a proper temperature and humidity, and further, must keep the air of the room in gentle, continuous motion; (3) it must remove the gases, odors, bacteria, dust and other substances that contaminate the air of inclosed spaces, and the impurities produced by the burning of gas, candles, lamps

and other sources of illumination. The purpose of ventilation, in other words, is not so much to bring out-door conditions indoors as to adapt indoor conditions to indoor life, which is necessary in order to perform the kind of work which can not, as a rule, be effectively carried on outdoors, involving quiet and protection from sudden changes and extremes of temperature, etc.

The mechanical problem of regulating the temperature and humidity within narrow limits and of furnishing definite quantities of fresh, moving air is not difficult for the ventilating engineer to solve, but to maintain those conditions necessitates the shutting of doors and windows. The conditions inside and outside of the room to be ventilated are not constant, depending upon the force and direction of the wind, the changes of outdoor temperature and to less extent, the air movements within the room. Allowance for these conditions must therefore be made, which can not be done with open windows and doors by any system of ventilation.

The efficiency of ventilation is measured by the results obtained at the breathing zone. Provided the heated, moistened and vitiated air which surrounds us is constantly removed and replaced with a fresh supply properly conditioned, it does not matter what the air is near the ceiling. Moreover, the air brought into the room must be clean, not smoky, dusty or laden with bacteria, or contaminated with gases or odors if the ventilation is to be satisfactory. The sources of the air, for this reason, must always be considered as of great importance. Ventilation and heating are also closely related. Clean air in motion and of proper temperature and humidity is necessary to indoor comfort. Satisfactory ventilation thus not only takes into consideration the physical condition of the air, but also demands a generous supply of fresh air.

The inhabitants of climates like ours are apt to live under artificial conditions in over-heated houses, and often complain of poor ventilation, regardless of whether the air supply is large or small. Our dwelling houses are usually constructed without any regard to ventilation, which requires just as much care and fore-

thought as the system of heating the house or supplying it with water, gas or electricity, or the proper disposal of wastes. Therefore, whatever system of ventilation is employed in a house, the public health nurse should, if possible, see that sunshine is admitted and that the rooms are frequently flushed with fresh air. When a room smells stuffy and close it may be taken as a fairly reliable index that the air is vitiated. The odors observed upon entering a room from the outside fresh air often furnish better evidence of imperfect ventilation than laboratory tests.

The size and shape of the room are very important factors in any system of ventilation. The minimal space should be about one-third the quantity of air required per hour; that is, from 700 to 1,000 cubic feet per person. The amount of space naturally varies with dwellings, factories, schools, prisons, hospitals, etc., also with the length of time the room is occupied and the nature of the work there carried on. But the regulation of space is by itself of little value, unless there is movement of air. A small space is sufficient if properly ventilated; a large space inadequate if improperly ventilated. Nor is it the air space of the room alone that influences ventilation; a lofty room is not necessarily an airy room, for a stratum of warm vitiated air soon occupies the upper portion of such space, and, so far as good air is concerned, has the effect of lowering the effective height of the ceiling to the top of the window or door. Floor space is much more important than height. According to Harrington, when the allowance is only 500 cubic feet per person the floor space should be 42 sq. ft. ($8\frac{1}{2}$x$5\frac{1}{2}$). Ordinarily 9 ft. is high enough for the ceilings of private dwellings, and 12 ft. for schools, etc.

Inlets and outlets should be provided, whatever system of ventilation is employed; proper inlets for the fresh air and outlets for the vitiated air. Whether the air is to be admitted near the floor and taken out near the ceiling or *vice versa* is a question much discussed among ventilating engineers. Perhaps the best arrangement is to have the inlet above and the outlet below, both on the same side of an inner wall. Ventilating ducts usually extend up the walls of the building through the roof, and should be hooded at the top.

Natural ventilation is that which depends upon openings such as doors and windows, and upon the air that comes through the pores of plaster, brick and stone, through floors and ceilings, and the cracks and crevices about window frames, etc. Natural ventilation is better in winter than in summer owing to the greater differences in temperature. On a hot, calm day it may amount to nothing. If there is too much moisture in the air of rooms it settles upon the pores of building materials. Rain has a similar effect. Ventilation is also impeded by oil and paint and by wall paper. Excessive nearby foliage and narrow streets with high buildings act as outside obstacles.

Natural ventilation may be favored by simple devices which may be placed at the top or bottom of windows to allow the entrance of fresh air and the exit of vitiated air.

Mechanical ventilation or "artificial" ventilation depends upon one of the three following methods: (1) plenum system which consists in the mechanical propulsion of air into the room; (2) vacuum system, which consists of the mechanical extraction of the air out of the room; (3) a combination of the plenum and vacuum systems.

Air may be forced into a room either by means of a warming apparatus or by mechanically propelling the air by means of rotary fans or "blowers." Every heating apparatus acts also as a ventilator, especially hot air furnaces and the direct-indirect system in use with hot air or steam pipes. Open fireplaces, stoves, etc., are also good ventilators, if properly constructed. The disadvantages of the mechanical systems of ventilation are that they are expensive to install and maintain, and furthermore, they are designed to work only when all the doors and windows are kept closed. On the other hand, they are effective in all kinds of weather and require less space than natural ventilation.

HEATING

Heating and ventilation go hand in hand, so much so that if ventilation is overdone, it causes unnecessary expense in heating.

Many of our houses are overheated with abnormally dry air in the winter time. This causes excessive evaporation from the skin, giving rise to a sensation of chilliness. It also causes at times

disposition to colds and other respiratory infections. Warm dry air does not give the same sense of warmth and comfort as does a cooler moist air. Air at 62° to 65° F. and a relative humidity of 70 per cent feels warmer than air at 70° to 72° F. and a relative humidity of 50 per cent.* Furnace, hot water, and steam heat tend to dry the air. Hence our houses and offices have to be overheated to make them comfortable unless some form of ventilating apparatus is used.

Both thermometer and hygrometer should be provided — in fact the hygrometer to give the humidity readings is quite as important an instrument to have in the home or workshop as is the thermometer to indicate the temperature.†

The chief methods of heating are: (1) Open fireplaces; (2) stoves; (3) hot air; (4) hot water or steam; and (5) electricity. The control of the temperature of a building is of more importance than the system of heating used.

Open fires heat mainly through direct radiation, and have the advantage of being cheerful and serve as good ventilators, but they are wasteful and give a very uneven temperature if depended on alone as a source of heat.

Franklin stoves consist of coal fires in a cast-iron stove with a pipe to carry off the products of combustion. They stand free in the room, and are very efficient as a source of heat but the heating is unequal. Such stoves when red hot are believed to allow carbon monoxide to pass through the cast-iron.

Open gas heaters without flues to carry off the products of combustion are bad from a sanitary standpoint. Such heaters may contaminate the air with carbon monoxide from leakage or from unconsumed gas; they also give off carbonic acid gas and other products. Open heaters burning oil are less objectionable than gas heaters.

* The Chicago Board of Health published a table designed to show desirable indoor humidity in the American home as follows:

Degrees of temperature	60° F.	66° F.	68° F.	70° F.	72° F.
Per cent relative humidity	64–74	50–54	40–48	34–40	30–34

†American Journal of Public Health. Vol. VI, No. 6.

Hot air furnaces consist of coal stoves which heat a series of tubes or plates in the dome over which air from the outside is passed. It comes in contact with the hot surfaces and is then conducted by a series of flues into the rooms of the house. A hot air furnace of this kind constantly carries fresh air into the house, and is, therefore, a very efficient system of ventilation. The objections to the hot air furnace are that the air becomes excessively dry and frequently is "burned" in passing over the heated surfaces in the dome, thus causing an unpleasant odor in the house. If sufficiently large pans of water are placed in the furnace to allow adequate evaporation of moisture, this dryness may be overcome, but the water pans provided are frequently inadequate.

Hot water and steam systems are a simple and effective means of heating buildings. The hot water system is especially applicable to small buildings and steam pipes to large buildings. The former is the more expensive to install on account of the greater amount of radiation required, but requires less fuel and is more easily regulated than a steam system which has a tendency to overheat. If the hot water pipes or steam coils are exposed directly in the room, the system is known as "direct." If the pipes are placed in a special box where the air from the outside is heated and then conducted into the room, it is called the "direct-indirect" system. In both of these systems the air is abnormally dried but not to such a degree as with the hot air furnace.

Electric heating is clean and easily regulated, but expensive. It has the disadvantage of being insufficient as a ventilating device.

Cooling of rooms has until recently received very little attention, but it is quite as practicable to cool rooms as to heat them and sometimes as important to health. The principle of all cooling devices depends upon the fact that when a fluid is transformed to its gaseous state it absorbs latent heat which is taken from the surrounding objects, and these, therefore, become correspondingly cool. Ammonia gas is now almost universally used in freezing machines for cooling refrigerators, cold storage rooms, etc., in this way. Humidifiers and air washers are also used to cool rooms and buildings. A simple method of cooling a room is to hang a

sheet, about a yard or more wide, near the ceiling and keep it constantly moistened by a stream of water flowing over it. Evaporation is brought about by blowing air on the wet sheet by means of an electric fan.

Lighting

Provisions should be made in all dwelling houses for an abundant supply of sunlight. Every room should have, if possible, at least one window receiving the sun during some portion of the day. It is not sufficient to give an ample window-space, which should be in proportion of one to five or six of floor space, but the immediate surroundings of the house must be taken into account. Thus, close proximity of other buildings or of trees may prevent sufficient light entering a room, although the window-space may be in excess of that required under ordinary circumstances. Light is as necessary to health as fresh air. "Where the sun cannot enter, the doctor does," is an old Italian proverb. "The man who plants a tree in front of his house begins to dig his own grave," is another saying.

Not only living rooms and dwellings, but churches, schools, lecture halls, courts of justice, and all places where many people congregate, must have plenty of light as well as good ventilation, in order to be healthful.

Recent investigations have shown that coal-gas or its products in indoor air are dangerous even when existing in very small quantities. This danger has increased with the introduction of the more modern water gas, which contains 30 per cent of carbon monoxide. Illuminating gas may readily pass from a broken gas main through the soil into the cellar of a house; this is aided by the suction and pumping action of the heating apparatus in the cellar. In passing through the soil the gas may be robbed of its characteristic odor, thus rendering it less easy of detection. Again, the gas pipes and fixtures in a dwelling may become leaky from a faulty stopcock, from rubber tubing used for drop lights, etc. For this reason, one should note the condition of the gas piping and fixtures especially in tenements, but also in one and two-family houses and public buildings. Attention should be paid to possible leaks in entering mains underneath houses, from which gas may arise and permeate the dwelling, unperceived

or disregarded by the tenants. Such inspections require no apparatus beyond a fairly keen sense of smell, and can be readily made during a plumbing inspection. Illuminating gas is much more dangerous than sewer gas.

The electric light is probably open to less objections on the ground of danger than any other of the illuminating systems mentioned. The advantages of the incandescent light, besides the brilliant white light it gives, are that it is steady and does not produce much heat, and that it does not pollute the air with carbon dioxide and other products of combustion.

INDUSTRIAL HYGIENE

Industrial hygiene or hygiene of the work shop is one of the most important subjects in public health, as it deals with the health and welfare of a large portion of the population.

In New York State the field of industrial hygiene is assigned to the Industrial Commission for investigation and protective regulation, with definite administrative machinery specified for the purpose, as indicated by the following sections of the Labor Law:

ARTICLE 3

§ 40. *Industrial commission created.*— There shall be a department of labor, the head of which shall be the industrial commission. The commission shall consist of five commissioners appointed by the governor by and with the advice and consent of the senate, one of which shall be designated by the governor as chairman.

§ 42. *Bureaus.*— The department of labor shall have the following bureaus: inspection; statistics and information; mediation and arbitration; industries and immigration; employment; workmen's compensation; women in industry; and such other bureaus as the commission may deem necessary, subject to appropriation by the legislature. Each bureau and division of the department and the persons in charge thereof shall be subject to the supervision and direction of the commission and of any commissioner duly designated to supervise the work of such bureau, and in addition to their respective duties, as prescribed by this chapter shall perform such other duties as may be assigned to them by the commission.

§ 51-a. *Rules and regulations.*—(1) The commission shall have power to make, amend and repeal rules and regulations for carrying into effect the provisions of this chapter, applying such provisions to specific conditions and prescribing means, methods and practices to effectuate such provision.

(2) The commission shall have power to make, amend and repeal rules and regulations for proper sanitation in all places to which this chapter applies, and for guarding against and minimizing fire hazards, personal injuries and diseases in all places to which this chapter applies, with respect to

a. The construction, alteration, equipment and maintenance of all such places, including the conversion of structures into factories, factory buildings and mercantile establishments;

b. The arrangement and guarding of machinery and the storing and keeping of property and articles;

c. The places where and the methods and operation by which trades and occupations may be conducted, and the conduct of employers, employes and other persons;

It being the policy and intent of this chapter that all places to which it applies shall be so constructed, equipped, arranged, operated and conducted in all respects as to provide reasonable and adequate protection to the lives, health and safety of all persons employed therein, and frequenting the same, and that the commission shall from time to time make such rules and regulations as will effectuate such policy and intent.

(3) Whenever the commission finds that any industry, trade, occupation or process involves such elements of danger to the lives, health or safety of persons employed therein as to require special regulation for the protection of such persons, the commission shall have power to make special rules and regulations to guard against such elements of danger by establishing requirement as to temperature, humidity, the removal of dusts, gases or fumes and requiring licenses to be applied for and issued by the commission as a condition of carrying on any such industry, trade, occupation or process and requiring medical inspection and supervision of persons employed and applying for employment, and by other appropriate means.

(4) The rules and regulations may be limited in their application to certain classes of establishments, places of employment, machines, apparatus, articles, processes, industries, trades or occupations or may apply only to those to be constructed, established, installed or provided in the future.

(5) The rules and regulations of the commission shall have the force and effect of law and shall be enforced in the same manner as the provisions of this chapter.

(6) No provision of this chapter specifically conferring power on the commission to make rules and regulations shall limit the power conferred by this section.

§ 53. *Bureau of inspection; inspector general; divisions.* The bureau of inspection, subject to the supervision and direction of the commissioner of labor, shall have charge of all inspections made pursuant to the provisions of this chapter, and shall perform such other duties as may be assigned to it by the commissioner of labor. The first deputy commissioner of labor shall be the inspector general of the state, and in charge of this bureau subject to the direction and supervision of the commissioner of labor, except that the division of industrial hygiene shall be under the immediate direction and supervision of the commissioner of labor. Such bureau shall have four divisions as follows: factory inspection, homework inspection, mercantile inspection and industrial hygiene. There shall be such other divisions in such bureau as the commissioner of labor may deem necessary. In addition to their respective duties as prescribed by the provisions of this chapter, such divisions shall perform such other duties as may be assigned to them by the commissioner of labor.

§ 54. *Inspectors.*— 1. Factory inspectors. There may be appointed not more than two hundred and twenty-five factory inspectors, not more than fifty of whom shall be women, within the appropriation granted by the legislature. Such inspectors shall be appointed by the commission and may be removed by it at any time. The inspectors shall be divided into seven grades.

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Of the inspectors of the seventh grade one shall be a physician duly licensed to practice medicine in the state of New York, and he shall be the chief medical inspector: one shall be a chemical engineer; one shall be a mechanical engineer, and an expert in ventilation and accident prevention; and one shall be a civil engineer, and one an expert in fire prevention.

§ 60. *Division of industrial hygiene.*— The inspectors of the seventh grade shall constitute the division of industrial hygiene, which shall be under the immediate charge of the commissioner of labor. The commissioner of labor may select

one of the inspectors of the seventh grade to act as the director of such division. * * * The members of the division of industrial hygiene shall make special inspections of factories, mercantile establishments and other places subject to the provisions of this chapter, throughout the state, and shall conduct special investigations of industrial processes and conditions. The commissioner of labor shall submit to the industrial board the recommendations of the division regarding proposed rules and regulations and standards to be adopted to carry into effect the provisions of this chapter and shall advise said board concerning the operation of such rules and standards and as to any changes or modifications to be made therein. The members of such division shall prepare material for leaflets and bulletins calling attention to dangers in particular industries and the precautions to be taken to avoid them; and shall perform such other duties and render such other services as may be required by the commissioner of labor. The director of such division shall make an annual report to the commissioner of labor of the operation of the division, to which may be attached the individual reports of each member of the division as above specified, and same shall be transmitted to the legislature as part of the annual report of the commissioner of labor.

§ 61. *Section of medical inspection.*— The inspectors of the sixth grade shall constitute the section of medical inspection which shall, subject to the supervision and direction of the director of the division of industrial hygiene, be under the immediate charge of the chief medical inspector. The section of medical inspection shall inspect factories, mercantile establishments and other places subject to the provisions of this chapter throughout the state with respect to conditions of work affecting the health of persons employed therein and shall have charge of the physical examination and medical supervision of all children employed therein and shall perform such other duties and render such other services as the commissioner of labor may direct.

Industrial hygiene constitutes in itself a separate branch of sanitary science, in which various medical, economic, and sociologic aspects are closely interwoven, and which can not be handled in a cursory manner or without intimate knowledge of the conditions involved. Moreover, the problems of each community present individual characteristics depending upon local conditions, which

should be the subject of special study, in order to determine their effects on the public health. One of the results of the creation of general industrial, part-time and unit-trades schools to be administered by the State Department of Education, schools which will participate in State and Federal aid, compulsory physical education and compulsory medical inspection, will be the extension of good health education and supervision to working minors and to adults required to attend instruction in these schools. Medical inspection of factories and mercantile establishments and health supervision of children employed therein are administered under the Labor Law. (See section 61 of Labor Law.)

The public health nurse will therefore be more concerned with those factors which pertain to personal or private hygiene, and which can be best dealt with by popular education in the home, than with those of a public nature which can be controlled only by definite public authorities. But since she may be required to assist in the prevention and supervision of the diseases of occupation, she should have a general knowledge of the problems involved.

PROBLEMS

The problems involved in industrial hygiene relate to hours of labor, to fatigue under various conditions, to the labor of women (and of children) as it affects both them and their offspring. In workshops, as in dwellings they deal with the subject of ventilation, of detrimental substances in the air, such as dust, fumes, gases, etc., of cleanliness and decency, and of communication of diseases, as by spitting and the like. In addition there is a large class of problems of a more special nature relating to diseases of occupation which are to be prevented or controlled, each different industry exerting its own particular effect on health. Besides the actual sanitary conditions, there are also questions of safety and of social welfare of the workers, which are also related to those of health. Every community, however small, has its industrial problems which can not be neglected for even where there are no factories, properly speaking, there are always such establishments as bakeries and other places where food is prepared, laundries, stores, etc., in which the health of the workers is an important consideration. Bakeries and

laundries also come under the supervision of the State Industrial Commission. (See Pars. 117 and 92 of Labor Law).

The enforcement of the Labor Law relative to the employment of women and children in mercantile establishments in all cities is under the jurisdiction of the Industrial Commission. Enforcement in villages of 3,000 or more population is under local boards of health.

Occupational Diseases

Occupational diseases have been classified by Oliver as follows: (1) those due to gases, vapors and high temperature; (2) those due to conditions of atmospheric pressure; (3) those due to metallic poisons, dusts and fumes; (4) those due to organic or inorganic dust and heated atmosphere; and (5) those due to fatigue. This is, of course, an arbitrary classification, to which may be added those diseases due to lighting condition in relation to eye strain, and those due to noise in relation to nervous disorders.

Among the more common diseases of occupation may be mentioned: Poisoning by lead, phosphorus, arsenic, mercury, and brass; caisson disease; and parasitic diseases such as anthrax (wool sorter's disease) and hook worm disease (miner's anemia). The relation of dusty trades and other depressing industrial conditions to tuberculosis is a very important aspect of the problem and one in which the public health nurse should be particularly interested, for tuberculosis is frequently found among workers in dusty trades. The problem of tuberculosis is so closely bound up with personal habits and home life, that it is quite as proper to consider it a house disease as an occupational disease. Statistics show, however, that tuberculosis is unusually prevalent among grinders, engravers, compositors, stone workers, millers, bakers, plasterers, brass workers, glass cutters, furriers, weavers, and persons in other trades in which there is undue exposure to dust and irritating vapors.

Much of the dust raised in industrial processes may be limited by improvements in machinery and preventive devices such as the wet processes. Certain dusty operations may be conducted in inclosed hoods or special cabinets so as to confine the dust and thus protect the workers, or the dust may be removed by suc-

tion fan devices. Good ventilation greatly diminishes the danger. When workmen are compelled to stay in dusty atmospheres they should wear respiratory masks. The dangerous effects of irritating or poisonous gases may be prevented by wearing special gas masks. The trouble is to make the workmen wear these masks; they prefer taking chances to wearing uncomfortable respirators. — until, perhaps, it is too late.

In New York State physicians are required to report to the State Industrial Commission all cases of industrial poisoning or disease which come to their attention. (See Article 5, Section 65 of the Labor Law.)

Public health nurses should make themselves familiar with terms and conditions applying to industry as specified in the Labor Law. Copies of this law and of the rules and regulations established by the State Industrial Commission may be had on application to the Commission.

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